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American Machinist

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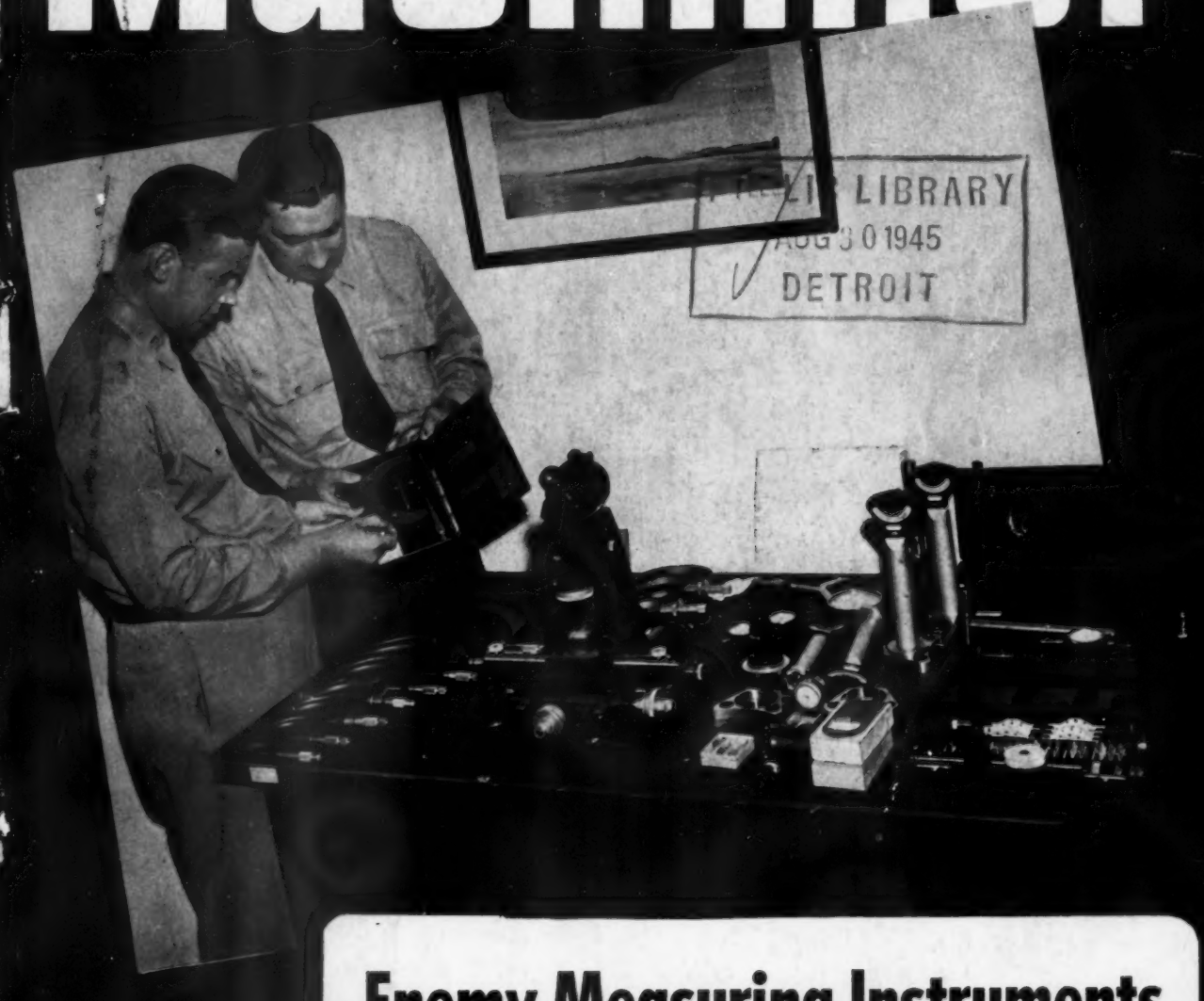

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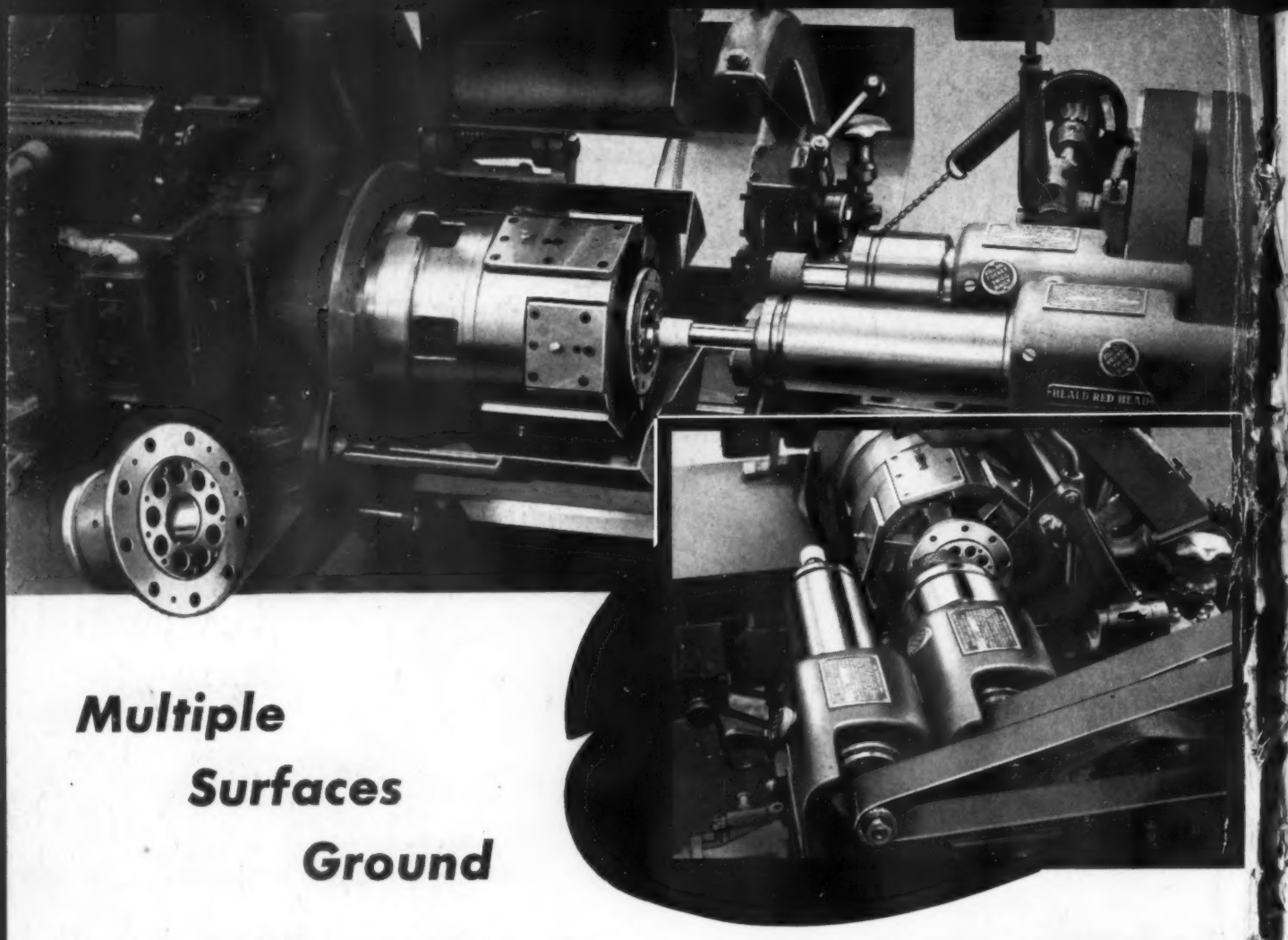
Enemy Measuring Instruments

GERMAN TOOLS TAKEN BY NAVY REFLECT HIGH PRECISION



Multiple Surfaces Ground

with HEALD TWO SPINDLE INTERNAL GRINDING MACHINE

Perhaps grinding operations on one of your parts involve a hole and outside face, or two different diameter bores and an adjoining face, or a bore, external diameter and adjacent faces. All of these surfaces can be ground in just one setup, one chucking. This means perfect squareness between I.D.'s and O.D.'s and faces, close concentricity of internal and external surfaces, plus, of course, substantially bettered production and cost savings due to less handling, as well as one machine for the job instead of two or even three.

•

Take for instance the plunger housing made of nitralloy shown above. The surfaces ground on this part in a *single chucking* not only include the blind hole and the outside adjacent face but also an external rabbet. Concentricity, squareness and parallelism are maintained to .002".

•

The grinding of the hole is performed by using the front wheelhead, then the workhead cross-slide is indexed and the surface adjacent to the hole is surface ground by the rear wheelhead. The workhead cross-slide is again indexed and the outer rabbet face is finished.

•

Our engineers would be glad to check on any job you have in mind. A complete bulletin on this machine gladly sent on request.

THE HEALD MACHINE COMPANY
WORCESTER 6, MASS.

More Precision · Less Cost **HEALD**

INTERNAL AND SURFACE GRINDING MACHINES • BORE-MATIC PRECISION FINISHING MACHINES

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American Machinist Chips

In This Issue . . . John Haydock, Executive Editor of *American Machinist*, describes in his article on German measuring instruments their methods of maintaining control of quality. The use of precision inspection tools in the operating department and a preference for optics and mechanical inspection rather than air and electric gages were characteristics of German practice. Utilization of slave labor was made possible by skilled supervision and "foolproof" instruments.

The return of 2,500,000 war veterans seeking valid reinstatements to their old jobs will pose problems for industrial companies large and small. *American Machinist* reviews this situation, indicating that many needless problems are being created and pointing out that common sense interpretation of the rehiring legalities will speed equitable relocation.

The experimental and production sawing of steel and aluminum alloy bars with carbide-tipped saw blades can be facilitated by using soluble oil coolant under pressure, writes A. Leonhardt, Supt. of Grove Regulator Company, in his timely article. Specific sawing recommendations are also given.

India . . . *American Machinist* is one of the periodicals in the technical reference library at an aircraft repair depot in central India. At the request of the commanding officer of the depot, the library was placed in Repairadise Inn, American Red Cross club, and Jane Lewis, Red Cross worker from Philadelphia, is librarian. Comprising texts, leading authoritative periodicals, and manuals relating to aeronautics, the library is aiding American airmen in keeping their craft in perfect condition for the arduous task of supplying the Allies in the India-Burma and China theaters.

Netherlands . . . We have just received a very interesting letter from the head of *Technisch Bureau an Ad. A. Klein* of Amsterdam. Mr. Klein noted that more than five years have passed since he was last in touch with his friends in the U.S. He says a tremendous task lies ahead in building up their industry, which has been badly damaged and needs a large number of machine tools and small tools. Mr. Klein asked for some of the current copies of *American Machinist* . . . as the latest edition he has on hand is the 26th Buyers Reference Number of January 25, 1939. He wants to get in touch with American manufacturers.

Needless to say, the issues of *American Machinist* he wants have been sent, in the interest of helping to develop once more a healthy foreign trade.

1945 Inventory . . . It is very gratifying to know that *American Machinist's* 5-Year Inventory of Metal-Working Equipment, published in the July 5 issue, is living up to the promises we made for it. Letters are pouring in daily, of which the following excerpts are typical :

"Let me take this opportunity to congratulate you on the splendid report of your complete Inventory. . . . I have studied it at some length and expect to give it further careful consideration. I believe that American Machinist *has again done an outstanding job for industry with this presentation."*

A. G. Bryant, Vice Pres., Cleereman Machine Tool Co.

"Knowing something about the difficulty of obtaining facts of this kind, I think that you have done an amazing job. The details must have added up to tremendous proportions.

R. J. Johnson, V. P. & Gen. Sls. Mgr., Norton Co.

"Certainly you are due the thanks of the Metal-Working Industry for establishing and maintaining this Inventory."

John S. Chafee, Director Tools Division, War Production Board.

"We consider that the Machine Tool Inventories which you have been preparing for 20 years are a very important contribution to the well-being of the Metal-Working Industries and also the country as a whole . . . congratulations upon rendering this important service and I hope that you will continue to prepare these Inventories."

Paul T. Norton, Jr., Prof. of Industrial Engineering, Va. Poly. Inst.

The editors will be glad to hear from readers at any time on their reactions to the Inventory—good or bad—and to learn of instances in which it has been of help. We also want to remind you that reprints of this study are available now at $1.00 each.

"Anyone remember what we were making before the war?"

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ANNOUNCING A PRECISION CONNECTION

for Clutch and Coupling Applications

GLEASON CURVIC* COUPLINGS

*TRADE MARK

A precision connection of a new type is now available for use in permanent couplings and releasing couplings (clutches). These couplings have teeth of radial direction and parallel depth, cut and ground into the faces of the connected parts.

Gleason Curvic Couplings are produced on the same Gleason cutting and grinding machines used for curved-tooth bevel gears . . . hence, they have the same high degree of accuracy and fast rate of production.

The Curvic design provides a precision, light, compact, and self-contained connection in which the teeth both center and drive. The accuracy and uniformity are such that complete interchangeability is possible, facilitating manufacture and assembly of coupled parts.

Investigate the advantages of Gleason Curvic Couplings for your clutch and coupling application ...write for descriptive brochure.

Watch for subsequent ads

GLEASON *Works*
Builders of BEVEL GEAR MACHINERY
FOR OVER EIGHTY YEARS

1000 UNIVERSITY AVENUE, ROCHESTER 3, N. Y., U.S.A.

14 SIZES OF VALVE PLUGS MILLED WITH THIS

CINCINNATI

CINCINNATI *No. 2-24 Automatic Rise and Fall Miller. Catalog M-909-1 containing complete specifications, will be sent on request. Sweet's Catalog File for Mechanical Industries gives a brief description.*

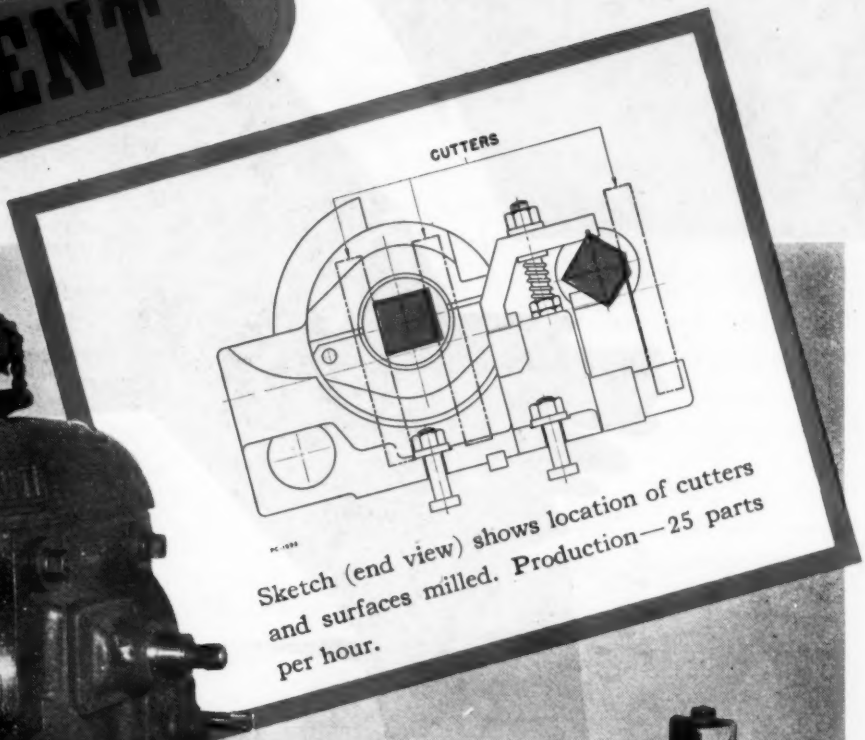
Have you a family group of parts in your shop? If you do, perhaps they can be machined at much lower cost by merely devising *one set of equipment to handle the whole family*. And manufacturing quantities of individual parts need not be exceptionally large to gain the greatest advantage through the use of automatic equipment. ¶ The setup shown here illustrates what was done to reduce the cost of milling the wrench end of 14 sizes of valve plugs. A standard CINCINNATI No. 2-24 Automatic Rise and Fall Milling Machine was equipped with a two-station fixture and the proper cutters by Cincinnati Application Engineers. A square is milled on the part held in the inside station, and then it is transferred to the station next to the operator where one corner is milled off to form a five-sided shape. (See drawing). The entire cutting cycle proceeds automatically, started with the flip of a small starting lever. To increase output still further, the inside station indexes automatically (to mill four sides of the square) through a hydraulic circuit. ¶ The Application Engineers here at Cincinnati Milling will be glad to work with you on your machining problems, and to devise the best method and equipment for lowest cost production.

KEEP YOUR PAYROLL ALLOTMENT FOR **WAR BONDS** UP TO **15%** OR MORE

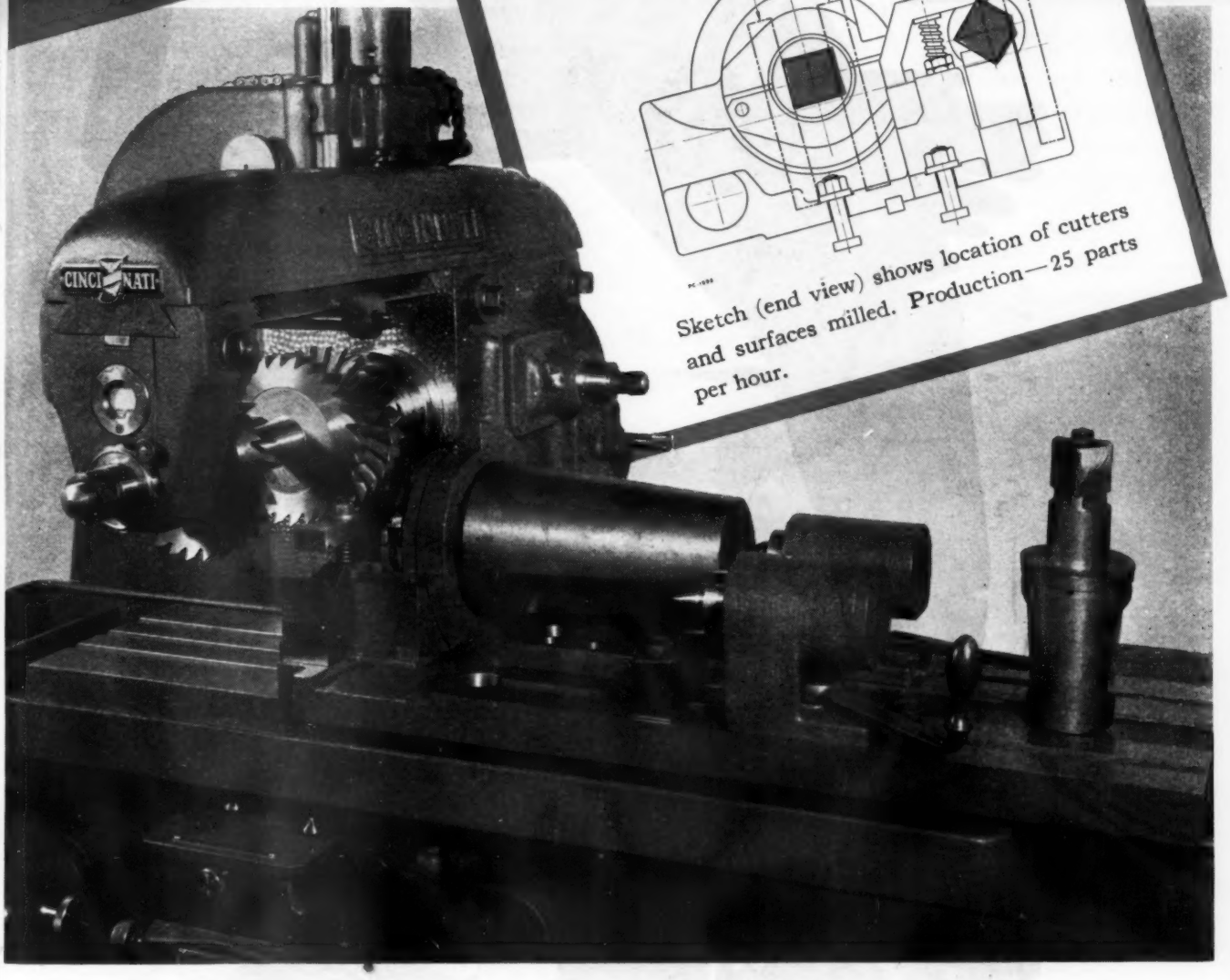
THE CINCINNATI

MILLING MACHINES

EQUIPMENT



Sketch (end view) shows location of cutters and surfaces milled. Production—25 parts per hour.



CINCINNATI *No. 2-24 Automatic Rise and Fall Miller with equipment devised by Cincinnati Application Engineers to mill the wrench end of 14 sizes of valve plugs. The rise and fall feature takes care of squaring out the radius which would ordinarily be left by the cutters.*

MILLING MACHINE CO. CINCINNATI 9, OHIO, U.S.

BROACHING MACHINES • CUTTER SHARPENING MACHINES

you wouldn't

build a 10-story building on a 5-story foundation

Nor would you put carbide cutting tools on a lathe lacking the fundamental rigidity for their use. Carbide tools have increased cutting speeds from 200 to 500 per cent. They require as much as 300 per cent more horsepower.

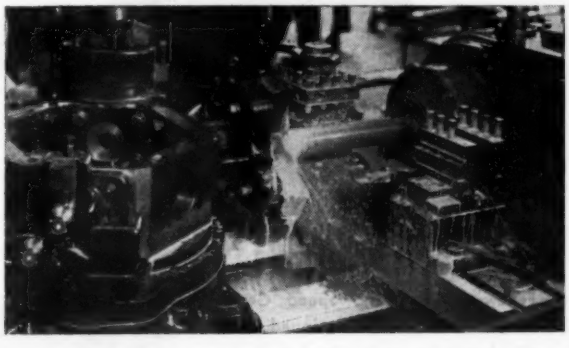
Modern Jones & Lamson Turret Lathes are designed specifically to carry this extra load, and more. They have the rigidity, they can transmit the power, they are easy to operate.

THE KEEN COMPETITION TO COME will make us all more cost-conscious than ever. Our jobs, and our earnings, as well as profits, will depend upon maximum production from the most efficient machines.

Now is the time to check your equipment. Plan now to scrap obsolete machines and replace them with good War Surplus machines or new machines. Our engineers will be glad to assist you.

What HORSEPOWER Are You Using?

This cut, on 2-inch bar stock, requires 300 per cent more horsepower with a carbide tipped tool than with a high speed steel tool, and Carbide halves the cutting time.

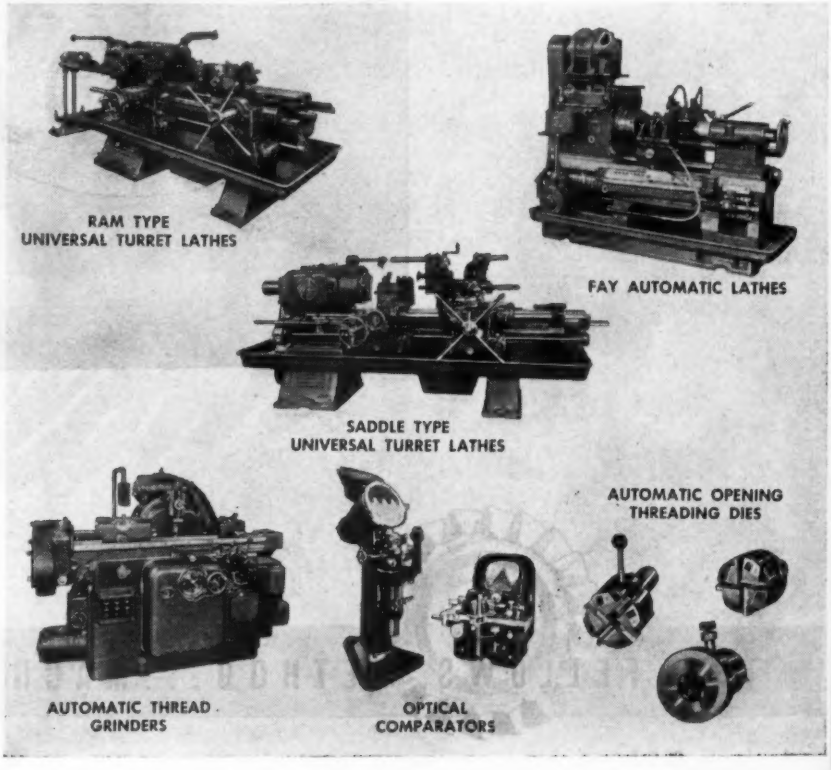


Engineered to "Carry the Load" for Most Productive Operation With Carbide Cutting Tools

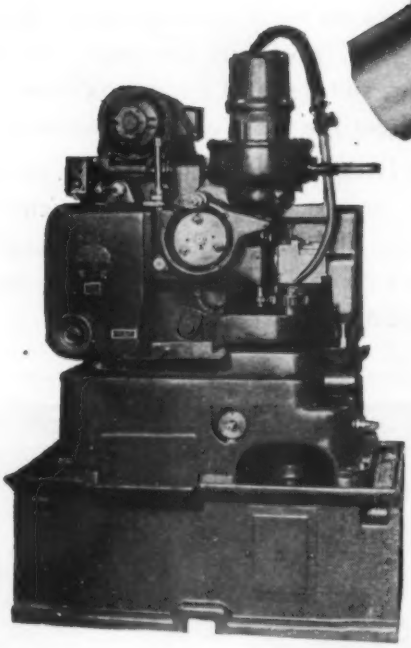
Turret Lathes

JONES & LAMSON
MACHINE COMPANY
SPRINGFIELD, VERMONT, U. S. A.

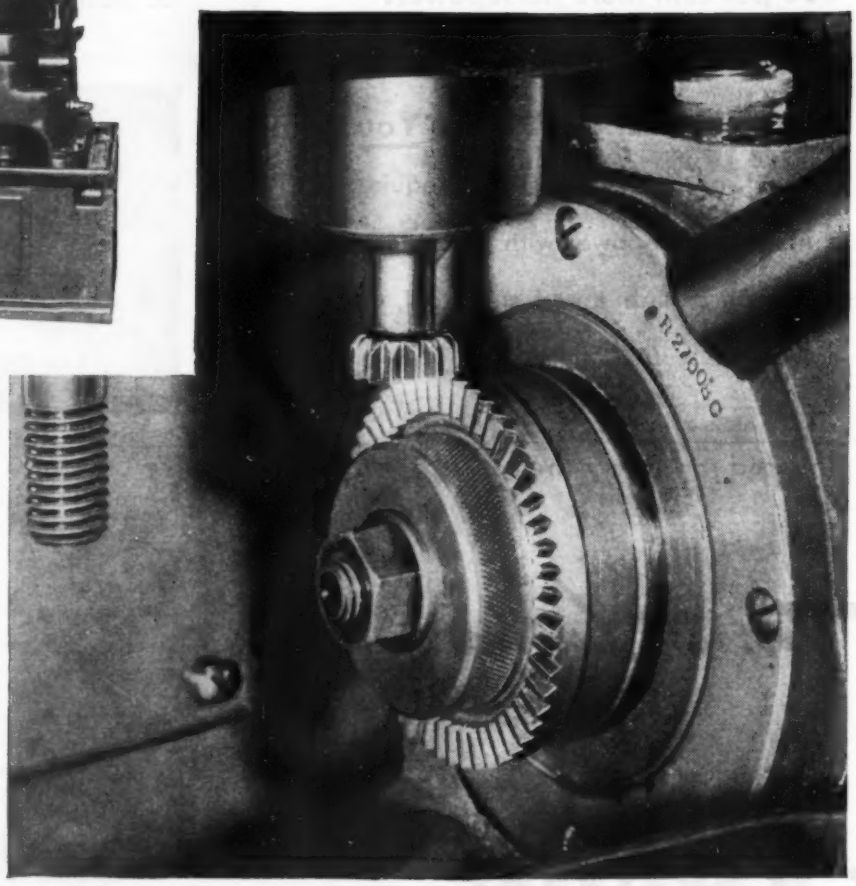
Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.



AN INVOLUTE FACE THAT



Fellows 7-type High-Speed Gear Shaper which may be equipped with attachment for cutting Involute Face Gears.



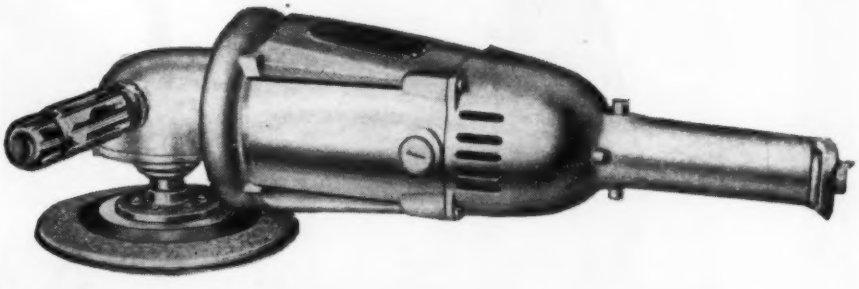
Photographs through the courtesy of the Millers Falls Company.

THE FELLOWS METHOD...MACHINES AND TOOLS FOR

EAR

PERATES ON ANGULAR DRIVES

without Thrust Complications!



You're looking at a Portable Electric Sander that delivers peak performance up to 4600 R.P.M. It is but one of many tools in industry that suggests inviting possibilities for 90° and other angular drives in which a Fellows-machined Involute Face Gear running in mesh with a spur or helical involute pinion can be used.

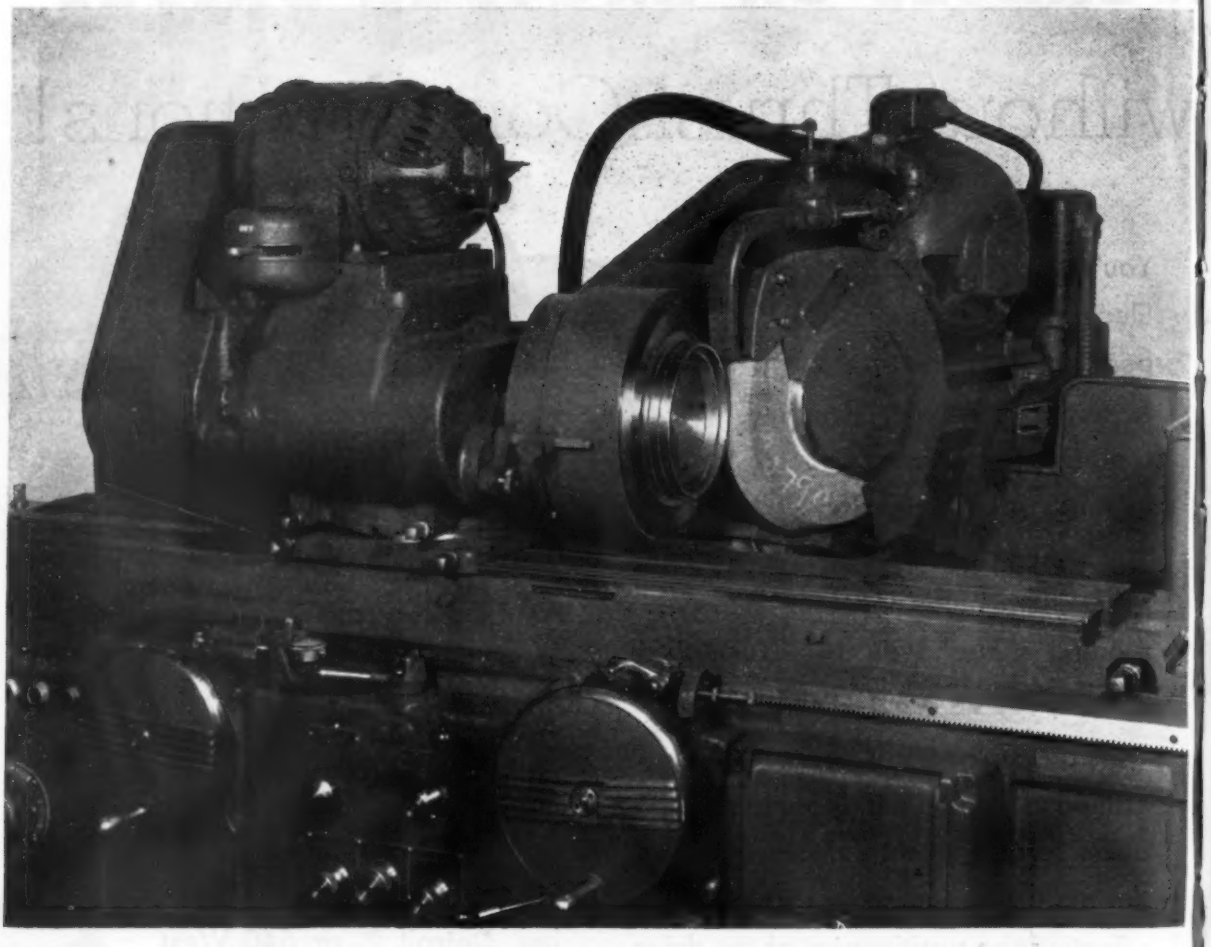
Outstanding among the advantages gained in this type of application is the absence of a thrust component. Also, the pinion may move endwise without affecting the positiveness of the drive, or conjugate tooth action.

For the complete story of the Involute Face Gear, and the way it works to increase assembly tolerances and lower costs, write for a copy of our circular, "The Face Gear". Address: The Fellows Gear Shaper Company, Springfield, Vermont, or 616 Fisher Building, Detroit 2, or 640 West Town Office Bldg., Chicago 12.

Fellows

R LL OPERATIONS FROM BLANK TO FINISHED GEAR

This setup— takes



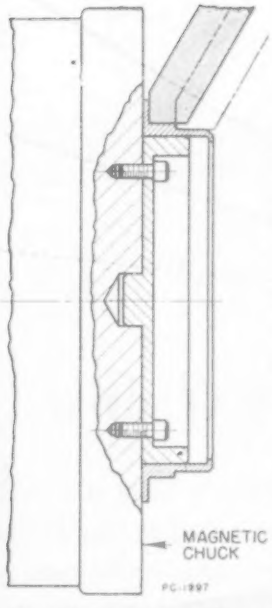
CINCINNATI Hydraulic Universal Grinder tooled up to grind two diameters and two shoulders on a retainer ring. Notice the sturdy construction of the FILMATIC Bearing Headstock. FILMATIC Bearings keep the spindle running absolutely true, despite the heavy magnetic chuck mounted on the end of the spindle.

KEEP YOUR PAYROLL ALLOTMENT FOR **WAR BONDS** UP TO **15%** OR MORE

CINCINNATI

CENTER TYPE GRINDING MACHINES

the uncertainty out of grinding thin-walled rings



Sketch of work and grinding wheel. Work is held to a magnetic chuck, and located from its inside diameter over a centering plug.

Two diameters and their adjacent shoulders on this thin-walled retainer ring had to be ground concentric, round, and square with each other. It was accomplished with a minimum of tailoring on a standard CINCINNATI 14″ x 36″ Hydraulic Universal Grinding Machine. The only special equipment is the FILMATIC Bearing Live Spindle Headstock, a Magnetic Chuck, and Dial Indicator Unit for the table. The wheel-head was set at an angle, and the grinding wheel and drive were interchanged to facilitate handling and to assure greater visibility. The Internal Grinding Attachment, standard on all CINCINNATI Hydraulic Universals, has been omitted, because it was not required for the operation. This setup met all requirements for finish and accuracy, and, in addition, proved highly economical and productive. ¶ If you have a problem involving centertype or centerless grinding, talk it over with Cincinnati Grinding Engineers. They will be glad to give you the benefit of many years' experience in the development and application of special equipment for difficult grinding operations, or to increase the output of low production jobs.

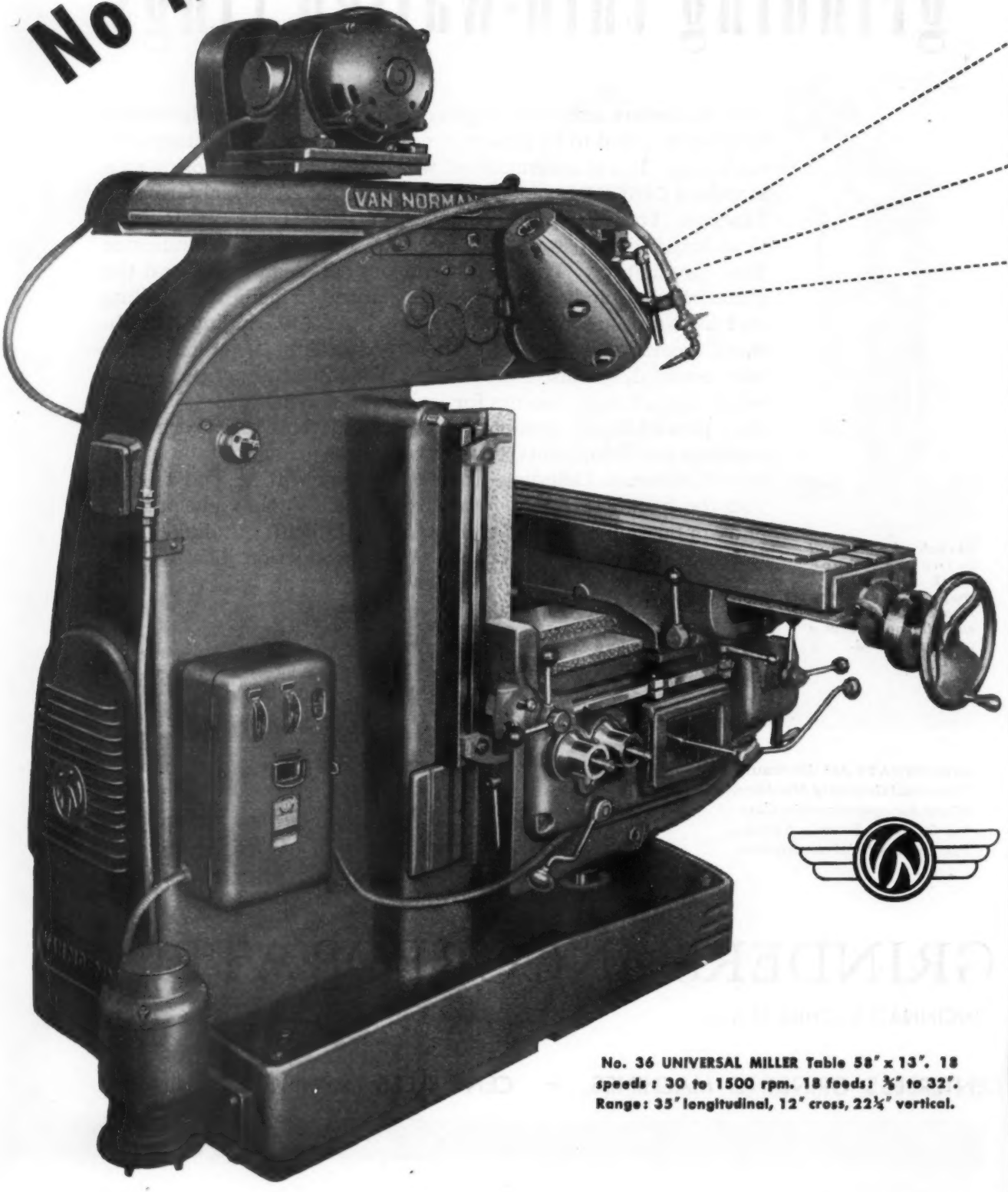
CINCINNATI *14″ Hydraulic Universal Grinding Machine. Write for specification Catalog G-471-1. Sweet's Catalog File gives a brief description.*

GRINDERS INCORPORATED

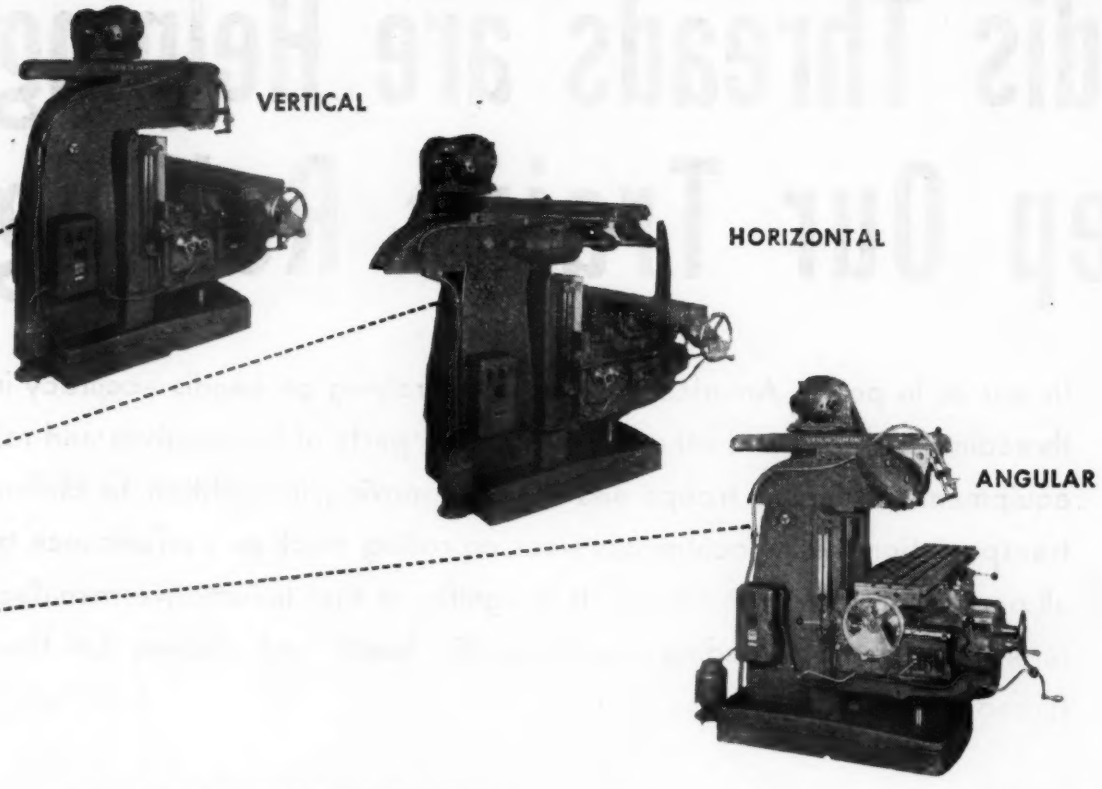
CINCINNATI 9, OHIO, U. S. A.

CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

No Reconversion Problems



No. 36 UNIVERSAL MILLER Table 58" x 13". 18 speeds: 30 to 1500 rpm. 18 feeds: ⅜" to 32". Range: 35" longitudinal, 12" cross, 22¼" vertical.



...with VAN NORMAN Ram-Type Millers on the job

Here's a milling machine that not only meets today's war requirements but will also be ready to use when you *reconvert*, tomorrow . . . because the adjustable cutterhead makes it adaptable to many jobs. This means that no matter what your milling jobs are . . . horizontal, vertical or angular . . . they can be produced on Van Norman Ram-Type Millers. The result is no idle machine time, a daily profit from continuous machine operation and greater miller production capacity. And that's not all . . . the versatility of the swiveling cutterhead permits many jobs to be carried through to completion without changing the original work set-up with subsequent reduction of rejects through more accurate work. In addition, Van Norman Ram-Type Millers provide such additional advantages as front and rear control of all power and manual feeds which give operators complete control of the operation whether they are at the front or rear position. The moveable ram, in combination with the saddle movement, increases the working capacity of the machine. The sturdy heavy-duty column, knee and saddle assure rigidity for extreme accuracy. The single lever feed selector permits quick, easy selection of the proper feed required for the cutting operation. Other advantages such as large easy-to-read dials, conveniently located speed selector, rugged over-arm, 6-way rapid traverse and new heavier ram all assure accuracy, ease of operation and cost-cutting production.

Investigate Van Norman Ram-Type Millers today. See for yourself how these machines will do your work today *better* . . . and solve your milling machine reconversion problems as well.

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS

"It pays to Van Normanize"

Landis Threads are Helping Keep Our Trains Rolling

In war as in peace American railroads are relying on Landis accuracy in threading staybolts and other vital threaded parts of locomotives and rail equipment. Keeping troops and supplies moving in addition to civilian transportation means continuous wear on rolling stock so performance of all parts is of vital importance. It is significant that locomotive manufacturers use Landis threading machines, die heads and chasers for their threading needs.

Landmaco Threading Machines are used exclusively in many railroad shops throughout the country for threading radial crown bolts, staybolts, and boiler studs. The outstanding design of the LANDMACO Machine, together with the inherent qualities—accuracy and economy—of the Landis long life Tangential Chaser which it employs, assures the lowest possible thread-cutting cost.

LANDIS

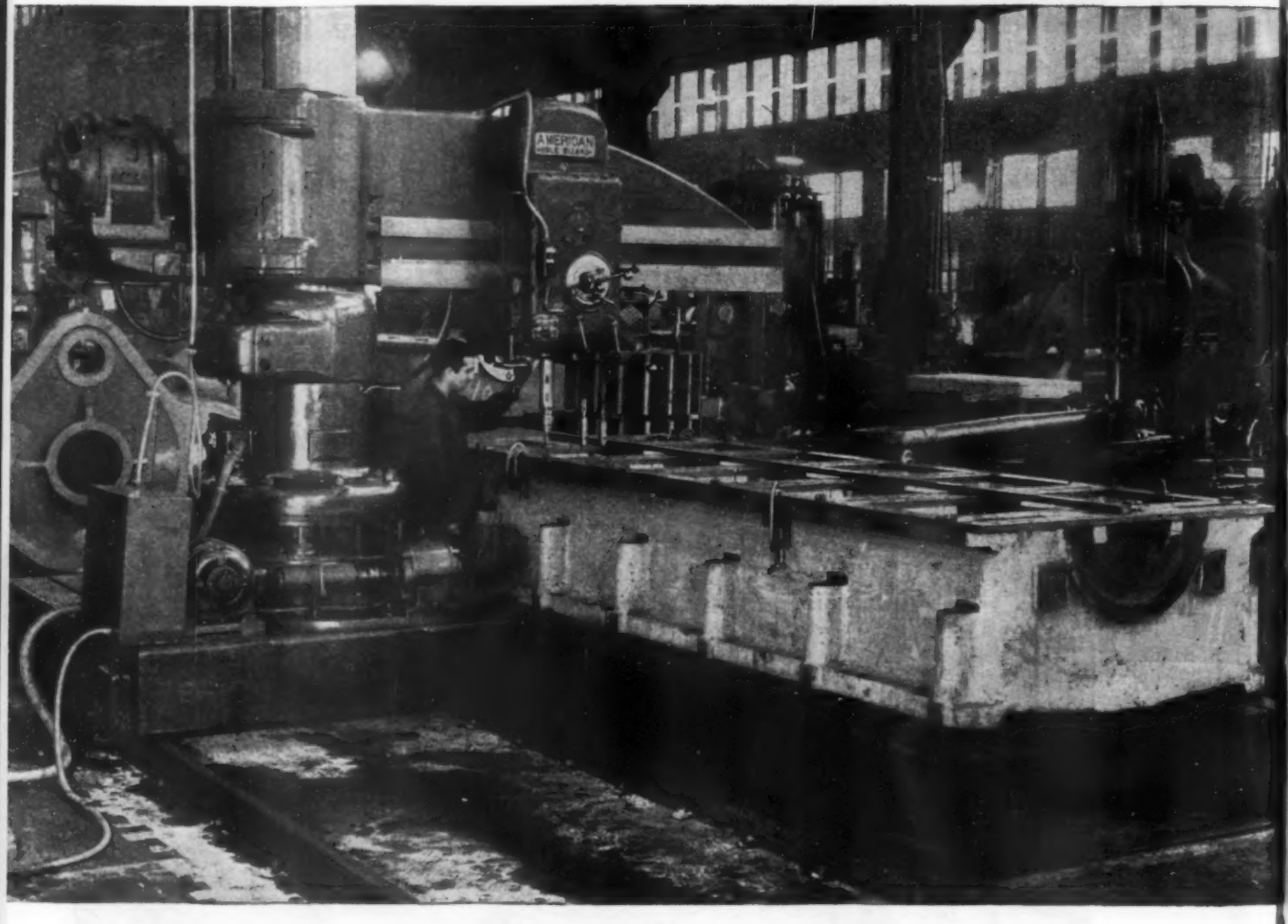
THREADING MACHINES

Write for Bulletin " LANDIS *for* Threading in Railroad Maintenance"

MACHINE CO. WAYNESBORO PENNA. U.S.A.

COLLAPSIBLE TAPS DIE HEADS PIPE THREADING MACHINERY

FULTON found a way...



FULTON IRON WORKS COMPANY of St. Louis, Missouri, found a way to beat the man power problem and at the same time to save over 40% in drilling time.

By mounting their six-foot "American" Hole Wizard Radial on a power driven, mobile truck, which permitted them to move the machine to the work instead of moving the work to the machine, they reduced their drilling time on diesel engine bed plates over 40%. This not only materially helped the man power situation but effected a substantial reduction in costs at the same time.

"American" Hole Wizard Radials are versatile machines. They lend themselves to unusual applications and as conventional drilling, tapping and boring machines they are unsurpassed.

May we send you descriptive Bulletin No. 326?

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio, U. S. A.

Lathes and Radial Drills

Greatest V-Belt Show ON EARTH!

EVERY MEMBER OF ALLIS-CHALMERS GREAT NEW V-BELT TEAM IS SPECIALLY DESIGNED, TESTED AND BUILT TO LICK A SPECIFIC DRIVE PROBLEM, SAVE YOU MONEY AND TROUBLE

DON'T WORRY IF YOUR BELTS MUST PRACTICALLY BATHE IN OIL OR GREASE. JUST ASK FOR SUPER-7 OIL-PROOF. I'M MADE OF IMPERVIOUS NEOPRENE.
OIL

IT PAYS TO MAKE ALLIS-CHALMERS YOUR

V-BELT DRIVE HEADQUARTERS

Texrope Super-7 V-Belts result from the cooperative research of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by A-C.

NEW SMALL HYDRAULIC

10"x 20" TYPE H

FOR ALL TYPES OF GRINDING

Cylindrical
Shoulder
Internal
Taper • Face

Precision Tool Room Work - Production of Small Parts to Close Limits

10"x 20" TYPE H HYDRAULIC UNIVERSAL GRINDER

LANDIS TOOL

Precision Grinders

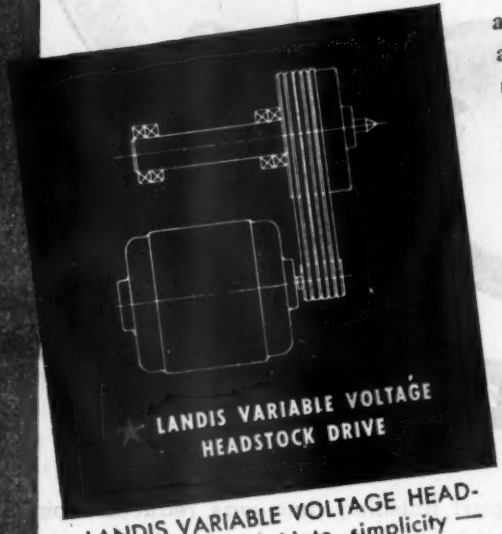
LANDIS TOOL CO.

UNIVERSAL GRINDER

✓ Flexible Operation
✓ Close Accuracy

● In the new small LANDIS TOOL 10"x 20" Type H Grinder the flexible operation and close accuracy are due to its universal features. Swivelling headstock and grinding wheel plus ease of setup and control make short production runs of small parts practical to instrument and aircraft accuracy.

LANDIS TOOL special features that contribute to accuracy and fine finish are: microsphere wheel spindle bearings; dynamically balanced rotating parts; and normalized, pre-aged castings. The variable voltage headstock drive is an exclusive LANDIS TOOL feature that provides an infinite number of speeds between 90 and 600 rpm. Fully electric with convenient rheostat control, it permits selection of the best speed for maximum production and finest finish. Fewer rotating and wearing parts are needed. Matched vee belts direct connected to motor and spindle plus only two preloaded super precision ball bearings eliminate vibration and give finer finishes. For further information, request Bulletin I-145.34.



LANDIS VARIABLE VOLTAGE HEADSTOCK DRIVE. Note simplicity — two rotating parts, two bearings, matched vee belts.

Landis Tool Special Features:

★ ***VARIABLE VOLTAGE HEADSTOCK DRIVE***
★ ***MICROSPHERE SPINDLE BEARINGS***
★ ***DYNAMICALLY BALANCED PARTS***
★ ***ANNEALED CASTINGS***

CONDENSED OPERATING DATA

Max. Dist. Between Work Centers 20"
Max. Work Swing 10¾"
Max. Work Dia. (10" wheel) 10"
Work Speed rpm. 90-600
Traverse Speed Range — 3" to 120" per min.
Headstock—swivels each way 90°
Grinding Wheel
Head swivels each way 90°
Lower base swivels each way 90°
Wheel Feed Increment range .0003" - .003"

LANDIS TOOL Company

WAYNESBORO, PA.

COSTS CUT 28% WITH CARPENTER STAINLESS

On one part finishing time was reduced from 23½ hours to 1 hour and costs were cut 28% per lot. And that's typical of results obtained on this job because a switch was made to soft and ductile Carpenter Stainless #6 Strip with our famous ABC finish.

FOR SHORT CUTS to making finer products at less cost, send for your copy of "Working Data for Carpenter Stainless Steels." A note on your company letterhead, indicating your title is all that's necessary.

THE CARPENTER STEEL COMPANY, 109 W. BERN ST., READING, PA.

more than corrosion resistance

YOU GET CORROSION RESISTANCE *Plus* LOWER COSTS ON FINISHED PARTS

...with Carpenter Stainless

By starting with a stainless strip which has a bright, smooth surface, free from marks or scratches, you can eliminate many final polishing operations and substantially cut finishing costs. Read how one manufacturer saved up to 28% on one job, by switching from a nickel-plated non-ferrous metal to Carpenter Stainless Strip.

The plates on this truss are made from Carpenter Stainless #6 (Type 430) Strip supplied with our standard ABC finish. All that was necessary to secure a bright and gleaming surface was to blank and tumble these parts. Previously made from nickel plated non-ferrous metal they had to be blanked, polished, plated, final polished and buffed. Now instead of finishing each piece separately, job lots can be tumbled at one time, thus affording substantial savings in time and expense.

By using Carpenter Stainless Strip with a bright finish, you can reduce your finishing operations and cut production costs. In your planning of new or redesigned products investigate Carpenter Stainless Steels. Your nearby Carpenter representative can help you select the stainless and finish that will do the job best. Call him in today.

GIVE YOUR PRODUCTS THESE ADVANTAGES WITH CARPENTER STAINLESS

- Strength and Rigidity
- Heat Resistance
- Weight Saving
- Freedom from Rust
- No Plating to Peel
- Ease of Assembly
- Longer Product Life
- Sales Appeal

Carpenter STAINLESS STEELS

BRANCHES AT
Chicago, Cincinnati, Cleveland, Detroit, Hartford, Indianapolis, New York, Philadelphia, St. Louis

Finishing Plug Gages to ... on a Production Basis...

Close Tolerances *with* NORTON LAPPERS

ACCURACY AND QUALITY OF FINISH the "twins" so outstandingly important to manufacturers of plug gages are being obtained with high efficiency at the Greenfield Tap & Die Corporation, Greenfield, Massachusetts, with a battery of NORTON Lapping Machines.

The exceptionally fine finishes produced on the surfaces of plug gages are of the utmost uniformity — a surface smoother and more durable than is obtainable by any other method fulfilling the requirements of production.

NORTON Lapping Machines have all the characteristics possessed by modern machine tools. Sturdy, compact and easily operated, they produce extremely high precision and high surface finish on a commercial basis.

NORTON COMPANY, WORCESTER 6, MASS.

M-507

Eighteen operations

Contour turning and boring this cream separator stem cover, and the stem itself, take only two operations for each piece, on the Monarch Magnamatic. Previous methods required 20 operations per piece.

In use, the stem and cover assembly rotates at 7000 rpm, so balance must be perfect to prevent wrecking the mechanism. Extreme thinness of walls (maximum $\frac{1}{8}''$) calls for delicate precision. Complete interchangeability of millions of pieces demands exact uniformity. All these are met with the Monarch Magnamatic.

This job illustrates how, with modern tools, mass production methods can be applied to the most difficult jobs, to reduce prices and thus enlarge markets. Our engineers will gladly work with you to help you cut your costs and improve your production with Monarch turning machines.

THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO

DIRECT FACTORY BRANCHES

CHICAGO 6, ILLINOIS
622 W. Washington Blvd.
Phone: Randolph 4295

CLEVELAND 6, OHIO
Room 209 Upper Carnegie Bldg.
10465 Carnegie Avenue
Phone: Garfield 2590

DETROIT 2, MICHIGAN
801 Fisher Building
Phone: Trinity 1-0426

INDIANAPOLIS, INDIANA
Maco Building
38 and College Avenue
Phone: Wabash 2650

NEWARK 2, NEW JERSEY
635 Industrial Office Bldg.
Phone: Mitchell 2-1770

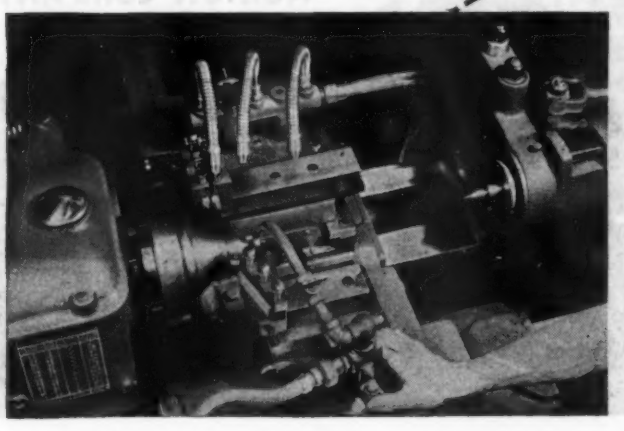
PITTSBURGH 22, PENNSYLVANIA
512 Empire Building
Liberty Ave. and Stanwix St.
Phone: Atlantic 6428

Representatives in Principal Cities

...WITH A SIMPLE TEMPLATE

The cutting tool automatically and accurately follows the contour of the thin metal template, to produce two or two million parts with equal accuracy. Template can be stored and used again at any time, and resulting parts will be perfect duplicates of the original run.

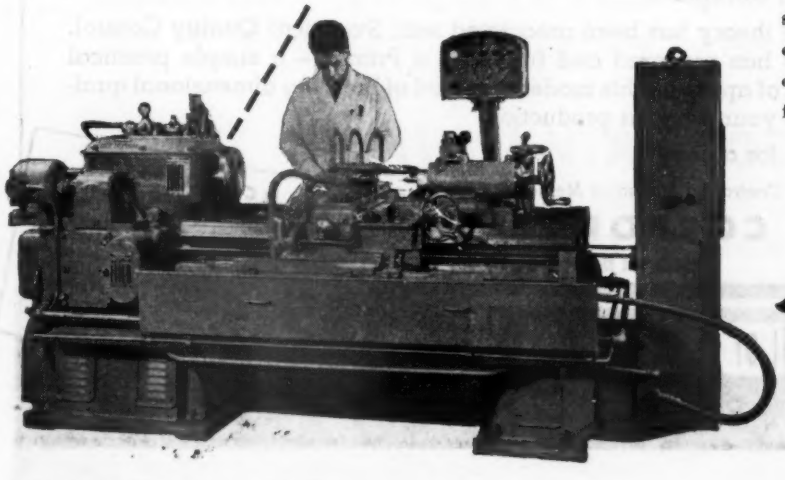
...AND SETUP LIKE THIS



Only one setup is required for each of the operations of contour turning the outsides of the two pieces, and contour boring the insides. Once the setup is made, the operator need only insert and remove the workpiece—and can readily attend two or more machines. Setup time from one job to another takes from 10 to 30 minutes, faster than on any other turning machine in the world.

saved on this piece

...ON A MONARCH MAGNAMATIC!

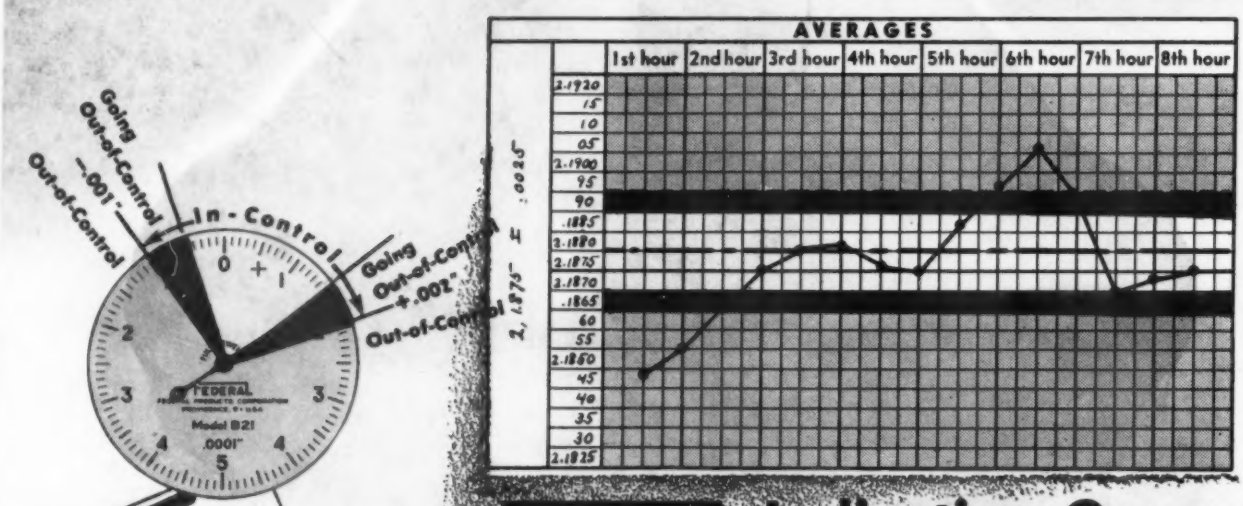


This turning machine is fully automatic, all electrically controlled. Six different feed rates can be automatically selected, depending upon depth of cut and finish required. One button on control panel starts the complete operating cycle. An endless variety of turning, boring and facing work can be done on this improved Magnamatic.

Monarch Saves Time

DIMENSIONAL *QUALITY CONTROL

Locks the Barn Door BEFORE the Horse Is Stolen



FEDERAL
DIMENSIONAL QUALITY CONTROL PRIMER
A SIMPLIFIED METHOD for APPLYING STATISTICAL QUALITY CONTROL to DIMENSIONS

This Federal Primer furnishes a simple and practical method of *applying* Dimensional Quality Control with the detailed theory eliminated.

FEDERAL Indicating Gages Obtain the Data and Keep Dimensions in Control . . .

Statistical methods of controlling dimensions build quality into the product by employing control over the variables which exist during its production. Only by the use of Indicating Gages is it possible to obtain the necessary data at production. Fixed or old style Gages can't, because they do not tell *how much* the same dimension *varies* on each workpiece.

Much theory has been associated with Statistical Quality Control. Federal has prepared and furnishes a Primer — a simple practical method of applying this modern method of building dimensional quality into your work at production.

Send for a copy.

* *Quality Control by Statistical Methods.*

FEDERAL PRODUCTS CORPORATION
1144 EDDY STREET PROVIDENCE 1, R. I.

BRANCH OFFICES
Atlanta • Avondale, Ariz. • Chicago
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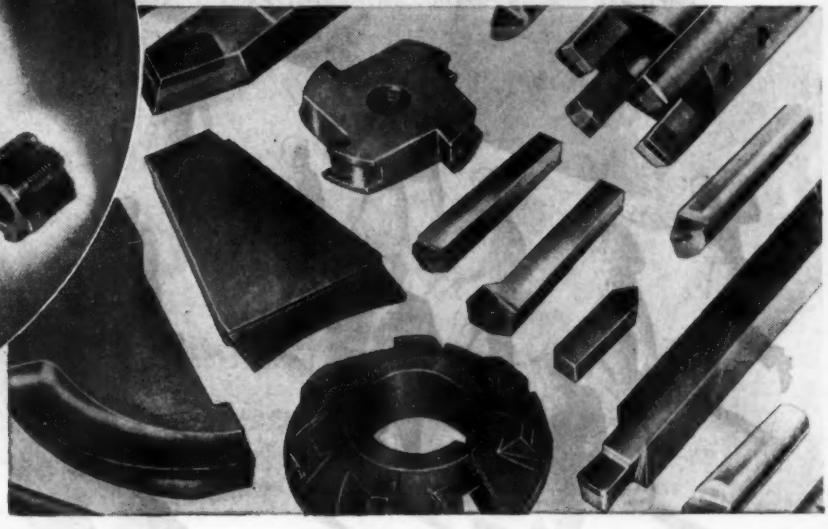
★ ★ ★ ★ ★ FEDERAL ★

Check CONTINENTAL for *Precision* CUTTING TOOLS



CONTINENTAL TOOL WORKS
CTW
EX-CELL-O CORPORATION

Since 1919 The Continental Tool Works (a division of Ex-Cell-O Corporation) has been producing special and semi-standard cutting tools to customers' drawings or part prints—until today the Continental name in the cutting tool field is commonly used as another word for "accuracy and quality." This long experience, coupled with the most modern and complete facilities, makes Continental the first choice as a cutting tool source. *Find out now how Continental can help assure you of high production efficiency*—get in touch with your nearest Ex-Cell-O representative or write direct.

CONTINENTAL TOOL WORKS

DIVISION OF EX-CELL-O CORPORATION

DETROIT 6, MICHIGAN

45-22

EX-CELL-O *makes* Special Multiple Way-Type Precision Boring Machines • Special Multiple Precision Drilling Machines • Precision Thread Grinding, Boring and Lapping Machines Broaches and Broach Sharpening Machines • Hydraulic Power Units • Grinding Spindles • Drill Jig Bushings • Continental Cutting Tools • Tool Grinders • Fuel Injection Equipment • R. R. Pins and Bushings • Pure-Pak Paper Milk Bottle Machines Aircraft and Miscellaneous Production Parts

To right: **Illustrated here is an Ex-Cell-O Junior Single-End Precision Boring Machine (Style 2112-A) with bronze parts bored, faced, turned and recessed on it. The parts are two mating halves of a metering chamber. The front spindle carries the bottom half of the part and the rear spindle carries the top half of the part. One cycle of the machine completely finishes all internal surfaces—boring, facing, turning, and recessing (3 bores, 5 faces, turn one diameter, recess mating diameters). Both halves are machined simultaneously. By machining all internal surfaces and the mating surfaces at the same time, complete concentricity and accurate mating of the two halves are insured. After the two halves are assembled, the measuring chamber is then turned on the O.D. on another Ex-Cell-O Style 2112-A Precision Boring Machine.**

WHAT'S AHEAD

FOR YOUR BUSINESS?

Civilian Production Also Demands Equipment of the Highest Possible Efficiency—*See Ex-Cell-O First!*

A WIDE RANGE OF BORING, TURNING AND FACING OPERATIONS IS POSSIBLE THROUGH THE EXTREME FLEXIBILITY OF EX-CELL-O PRECISION BORING MACHINES

Low unit costs will be essential if an expanding postwar market is to be yours. Ex-Cell-O is ready to assist you in realizing this objective. Ex-Cell-O experience in pioneer development of precision machine tools—including the first commercially successful horizontal-type precision boring machine and precision thread grinder—is at your service. Whether your peacetime production plans involve standard or special machines, re-tooling, cutting tools, or miscellaneous production parts, you should decide now to *see Ex-Cell-O!* Contact the Ex-Cell-O head office in Detroit, or any of the Ex-Cell-O representatives stationed in 32 other leading industrial centers throughout the United States and also in Canada.

EX-CELL-O CORPORATION · DETROIT 6

Where increased production, high accuracy, and greater economy through multiple operations are required . . . See EX-CELL-O First!

Standard and Special Multiple Way-Type Precision Boring Machines

•

Continental Cutting Tools

Precision Thread Grinding Machines

•

Precision Lapping Machines

•

Broaches and Broach Sharpening Machines

Multiple Drilling and Other Special Purpose Machines

•

Tool Grinders

•

Hydraulic Power Units

Grinding Spindles

•

Drill Jig Bushings

•

Aircraft and Miscellaneous Production Parts

Fuel Injection Equipment

•

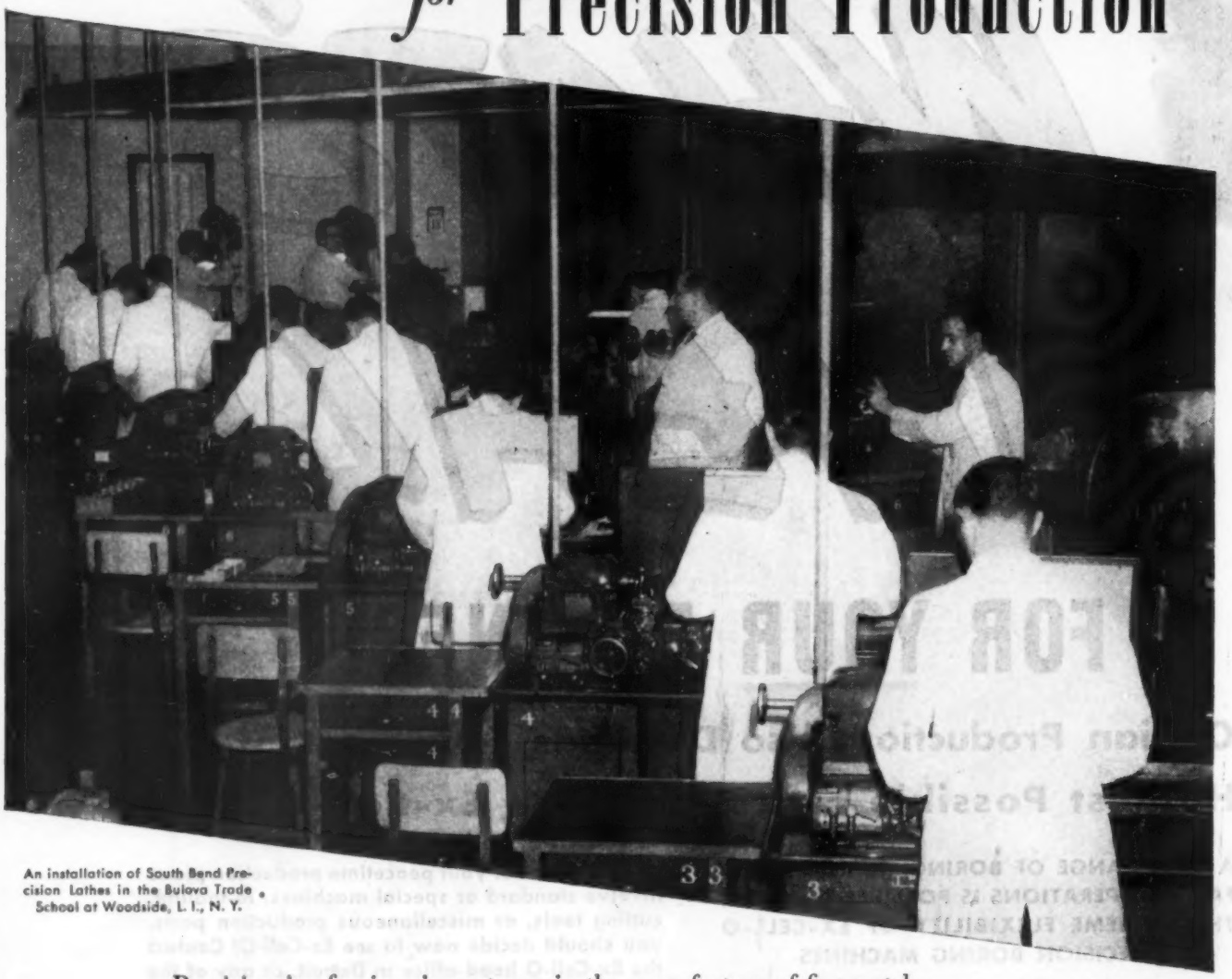
R.R. Pins and Bushings

•

Pure-Pak Paper Milk Bottle Machines

45—94

South Bend Lathes *for* Precision Production



An installation of South Bend Precision Lathes in the Bulova Trade School at Woodside, L. I., N. Y.

Precision is of prime importance in the manufacture of fine watch parts. Skill and accuracy are required to operate the intricate machines which produce these parts. Specially trained supervisors and lead-men are needed to set up and maintain the machines. It is significant, therefore, that the Bulova Watch Company chose nine South Bend Model A 9-inch Underneath Motor Driven Lathes for use in its Trade School which supplies both the precision tools and the highly trained personnel which are essential to the making of world-famous Bulova watches.

Write for New Catalog, No. 100-D

Illustrates in full color and describes South Bend Engine Lathes and Toolroom Lathes with 9", 10", 13", 14½", and 16" swings. Also, Precision Turret Lathes with ½" and 1" collet capacities.

SOUTH BEND LATHE WORKS

419 E. MADISON ST., SOUTH BEND 22, IND. • *Lathe Builders for 38 Years*

Just as magnesium casting alloys lighten products . . .

so Dow's unmatched technical experience can lighten production costs

When Dowmetal magnesium alloys enter your shop, they bring with them the results of 29 years' experience by the pioneer producer of structural magnesium: complete dependability in supply . . . a full line of fluxes and accessory materials . . . the technical services of an expert staff of metallurgical specialists.

The many Dowmetal magnesium alloys, developed to fit precisely the property requirements of specific applications, are of uniformly high quality. Continuous Dow research has improved corrosion resistance, facilitated production and fabrication and developed efficient shop practice.

Magnesium alloys, in the form of ingots, produce strong, sound, easily machinable castings. In addition, Dow is one of America's leading producers of fabricated magnesium products.

To obtain the manifold advantages of magnesium and the benefits of Dow's complete fabrication facilities, you need only contact the nearest Dow office.

MAGNESIUM

THE METAL OF MOTION

MAGNESIUM DIVISION, THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • St. Louis • Chicago • Houston • San Francisco • Los Angeles • Seattle

What do You Say, Doc?

THE "DOCTOR"—
McGarvey Eddleman of Allis-Chalmers Norwood Works—is taking a temperature reading during the heat-run test. It's just one precaution that helps Allis-Chalmers build consistently great motors.

NO—THAT'S NOT a sick motor. Actually it's a very *healthy* one. But that's something we must know — through generous sample testing — before Allis-Chalmers motors can tackle jobs for you.

Part of the "physical exam" that motor at the left must pass is the heat run test. Bristling with thermometers, the motor runs at full load — and speed and temperature are recorded for every hour.

Five or six hours can tell you a lot about a motor's characteristics —but it takes more like five or six *years* to tell you its *character.*

And it's the test of time in which Allis-Chalmers motors have established that they are *great* motors. That's why you hear so many engineers say: "You can depend on Allis-Chalmers Motors!"

• • •

If you could meet and talk with the men who build Allis-Chalmers motors, you might be surprised to learn how keenly they are aware of the big *personal* stake they have in every motor they build for you.

They know that factory tests to fully pre-determine how well a motor is built *just don't exist;* that there's still no substitute for responsible craftsmanship.

And they know that when they build great motors for you they're making *friends*—and that no company and its workers can have too many of them. ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 1726

YOU CAN DEPEND ON ALLIS-CHALMERS MOTORS

It is reported that . . . . . .

A mathematical method for exactly determining the shapes of cams has been worked out by two university professors. *Carver & Quinn, Cornell Univ.*

get ready with CONE for tomorrow

Reverse-cycle heating is in actual use. In principle it consists in taking heat from the outside air (even the coldest air has some heat in it) and concentrating it for use indoors. Even better results may be had by using the heat in ground water from deep artesian wells. Where electricity is cheap, it seems to be a practical method as the only cost is the operation of the pump. *Science Digest.*

get ready with CONE for tomorrow

Plastic records used in a new electronic dictation machine are claimed to be so thin and flexible that they may be folded and mailed. *Sound Scriber Corp.*

get ready with CONE for tomorrow

A new method of spraying airplane "dope" uses heat instead of thinner to liquefy the material. *Sherwin-Williams.*

get ready with CONE for tomorrow

One city is investigating the possibility of an 8-mile subway in which passengers would be carried by an endless conveyor belt. *Detroit.*

get ready with CONE for tomorrow

Water, nearly equivalent to distilled water in purity, may now be produced by passing through filters made of synthetic resins. After continued use, the filters may be renewed by flushing. *Resinous Products Chemical Co., Philadelphia.*

get ready with CONE for tomorrow

One of our airlines plans to inspect its planes by X-ray at 750 hour intervals in order to reveal hidden weakness or failure. A portable X-ray machine will be used and 4 to 5 days will be required to take the 352 shots believed to be necessary. *Air Transport.*

One factory, serving 18,000 meals per day, believes that the day of the lunch pail is over. *Sperry Gyroscope.*

get ready with CONE for tomorrow

One of the largest printing press manufacturers announces a postwar press to produce newspapers with 4 colors on all pages. *R. Hoe & Co., Inc.*

get ready with CONE for tomorrow

High-nickel alloy tubes can now be made in sizes up to 11 in. diameter by extrusion. *International Nickel.*

get ready with CONE for tomorrow

A new high speed motion picture camera takes 8,000 pictures per second. When projected at normal speed, the result is a slowdown of 500 to 1. *Bell Telephone Laboratories.*

Chemists expect that fish may become more important as a source of industrial chemicals than as food. Already substances have been isolated that appear to be useful in paints, inks, lacquers, plastics, photographic papers, adhesives and medicines. *Business Week.*

get ready with CONE for tomorrow

A Cuban inventor has received a patent for the production of alcohol by continuous flow. *Patent 2,371,208.*

get ready with CONE for tomorrow

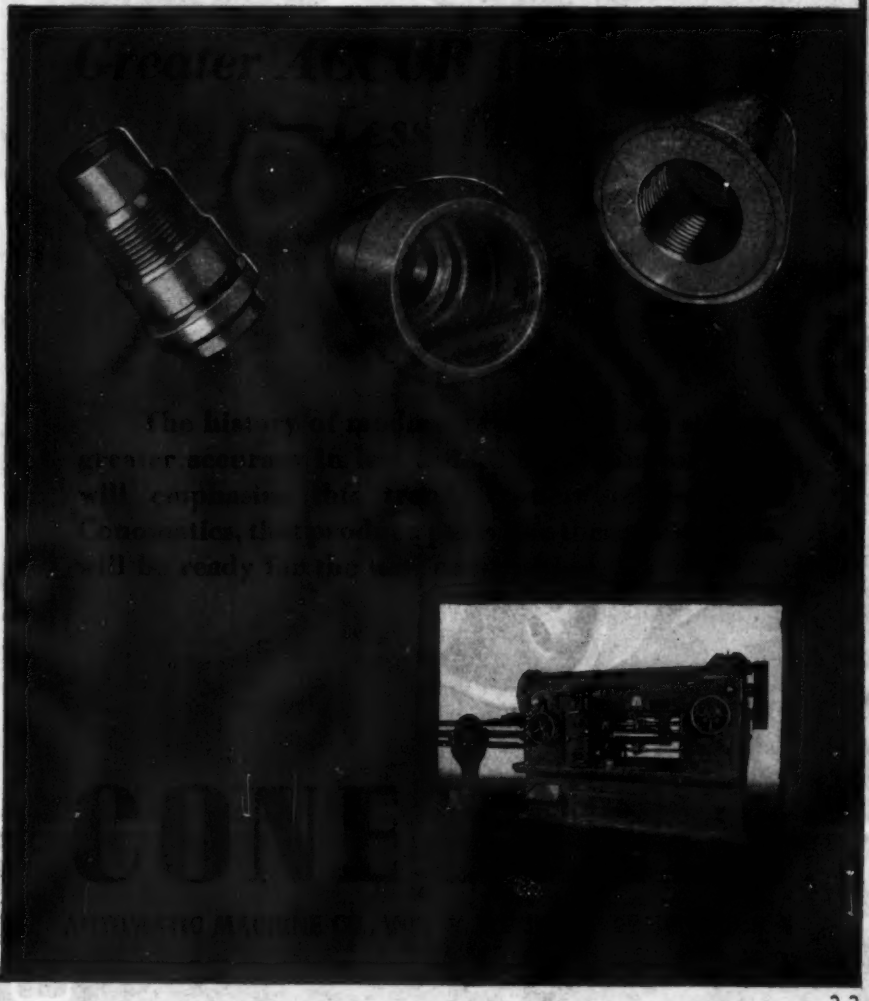
A method is reported for making synthetically optical crystals far larger than any produced by nature. *Polaroid Corporation.*

get ready with CONE for tomorrow

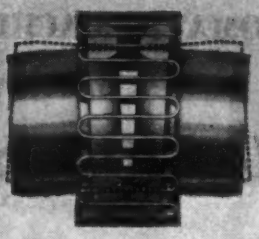
Permission has been granted to build a station for color television experiments. *Zenith Radio.*

get ready with CONE for tomorrow

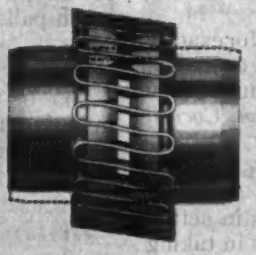
A large manufacturer of railroad cars expects that 27,000 of the country's 30,000 railway passenger cars will have to be replaced after the war. *Pullman-Standard.*



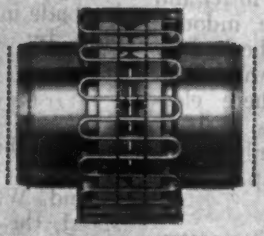
ALL THIS



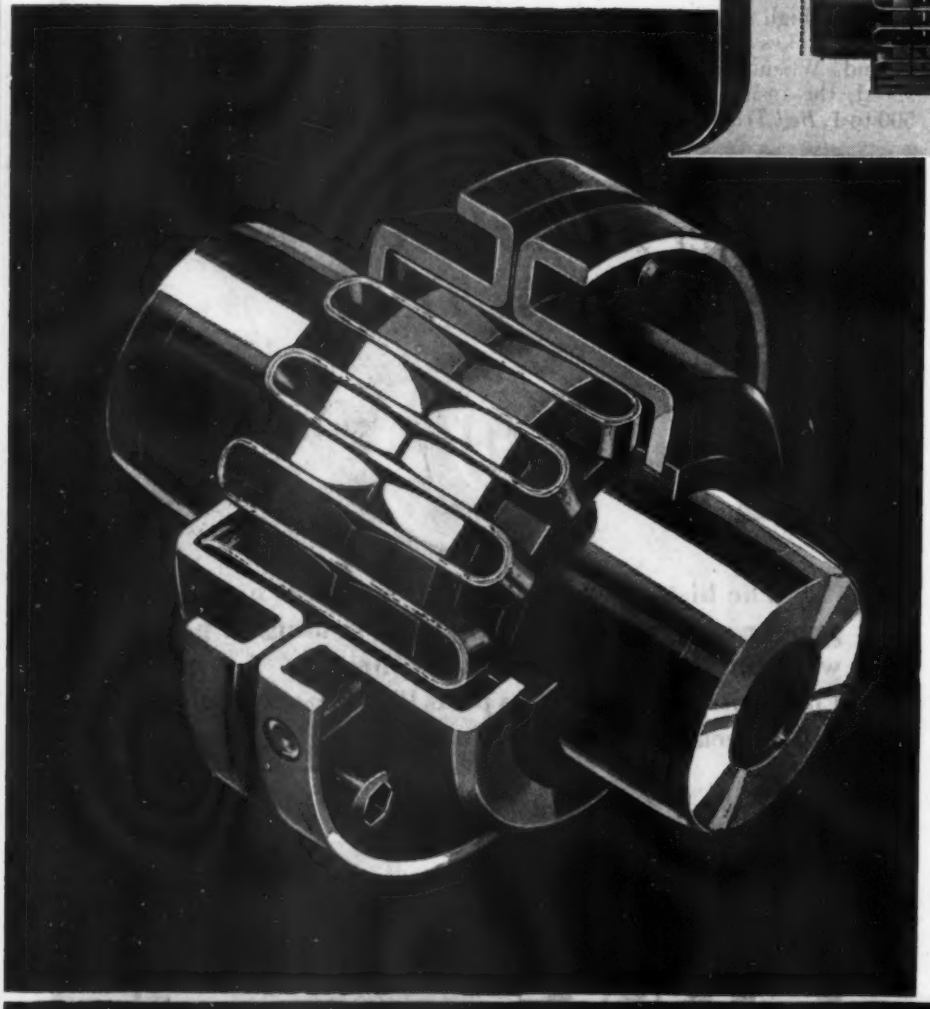
Angular Misalignment. Under angular misalignment the design of the Falk Steelflex coupling permits a rocking and sliding action of lubricated grid and hubs that allows the greatest freedom of accommodation to angular misalignment, while at the same time transmitting the power through the resilient grid with no lost motion or backlash.



Parallel Misalignment. When parallel misalignment is involved, the resilience of the grid-groove combination comes into full play. The movement of the grid in the lubricated grooves accommodates the misalignment, while still permitting full functioning of the grid-groove action of the coupling in absorbing shock and dampening vibration.



Free End Float. Because the grid member slides freely in the lubricated grooves, the Steelflex coupling permits free and independent end float for the shafts of both the driving and driven members, or of either one. If it is desired that end float be restricted, provision can be made to limit it to any required amount.



Why the Falk Grid-Groove Design Gives you a Plus Value Coupling

Many different kinds of couplings are available. Almost any of them will, to a degree, correct angular misalignment.

To probably a lesser degree, they will correct parallel misalignment, and, if provisions are intentionally made, they will permit a certain degree of end float. But it is the manner in which they provide for these corrections that determines their value to you.

Falk Steelflex Couplings do well-nigh perfectly all that a coupling should do and, in addition, they provide torsional resiliency in addition to flexibility. This is a definite plus value.

IT ALWAYS PAYS TO CONSULT **FALK**

...and TORSIONAL RESILIENCE, Too!

Because of the Grid-Groove Design of FALK STEELFLEX COUPLINGS

Here's How It Functions... Falk Steelflex Couplings are conspicuous because of their grid-groove design... The grid-groove design is the net result of long experience in gear design... This is important, because in most cases a coupling is used in conjunction with a driven machine involving the use of gears... The long experience of Falk engineers in designing gears has been responsible for coupling design which not only provides the flexibility long considered essential but also provides the torsional resilience which enables Falk Steelflex Couplings to transmit power smoothly, efficiently, with an almost total elimination of the effects of shock, to dampen vibration, and to cushion the load even under severe peak loads... Here is a very simple exposition of how the Falk grid-groove design imparts unusual performance:

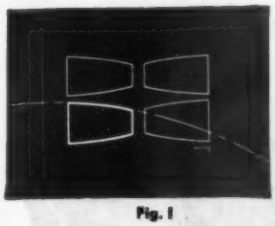


Fig. I

FIG. I. Grooves, in a precise arc, and with a radius and length proportional to the size of the coupling, are cut into two identical hubs of moderately high carbon steel—forged or Falk alloy cast steel... **FIG. II.** These grooves provide a snugly fitting slot for a grid member made of chrome alloy steel with an elastic limit of 180,000 pounds per square inch and an ultimate strength of 220,000 pounds per square inch... **FIG. III.** This grid fits snugly into the curved grooves cut into the hubs of the coupling. The grooves provide a scientifically cut bearing surface for the grid. This bearing surface extends from the outer to the inner edge of the hubs. The grid bears on the grooves in proportion to the load... **FIG. IV.** Under light loads, the grid bears only at the outer edges of the grooves. This permits a long, free, elastic span between the outer edges of both hubs. Power is transmitted through almost the entire length of the grid rung... **FIG. V.** Under normal loads, the grid bears on a larger area of the grooves and the span of the grid rung is automatically shortened as the load increases. It transmits more power without increasing internal stress and maintains its capacity to absorb shocks, dampen vibration and cushion the load... **FIG. VI.** Under peak loads, the grid rungs bear over almost all of the curve surfaces of the grooves. The span of the grid rung becomes very short. The coupling still remains torsionally resilient. Under the impact of shock loads the grid flexes and continues to transmit power smoothly and efficiently.

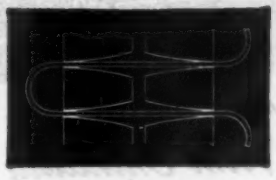


Fig. II

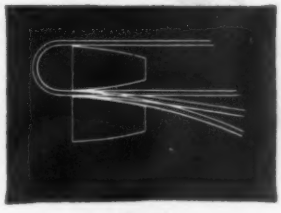


Fig. III

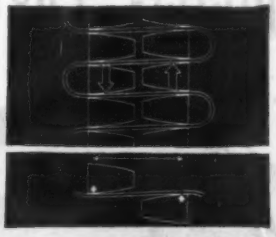


Fig. IV

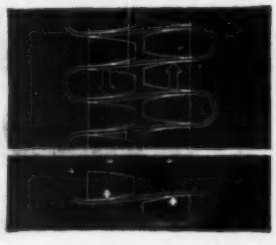


Fig. V

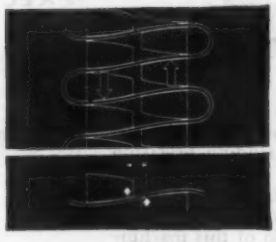


Fig. VI

There are 13 types and 33 sizes of Falk couplings to meet all requirements. (Get the more detailed information, including Torque Deflection and Stiffness Factor Curves, which is available to you upon request). For specific information and recommendation to meet your needs, call the nearest Falk representative or distributor.

THE FALK CORPORATION, MILWAUKEE 8, WISCONSIN

For over fifty years precision manufacturers of Speed Reducers... Motoreducers... Flexible Couplings... Herringbone and Single Helical Gears... Heavy Gear Drives... Marine Turbine and Diesel Gear Drives and Clutches... Contract Welding and Machine Work. • District Offices, Representatives, or Distributors in principal cities.

FALK... A GOOD NAME IN INDUSTRY

FOR THE FIRST TIME—

Authoritative information about Crush Form Grinding Precision Contours on a Completely Engineered Machine

Results of ten years of full-time study and development are graphically illustrated in this first pictorial booklet on crush form grinding precision contours with surface grinders. Savings in time and labor and improvement of finished work made possible by completely engineered machines warrant a thorough investigation of this machine process.

Send Coupon for Free Copy

CRUSH FORM CONTOUR GRINDING DEVELOPMENT LABORATORY

The Thompson Grinder Co. Inc., Dept. 10, Springfield, Ohio

Gentlemen: Please send me your new 16 page pictorial book describing Crush Form Contour Grinding on Surface Grinders.

*Name*_____ *Position*_____

*Company*_____ *Address*_____

*City*_____ *Zone* ____ *State*_____

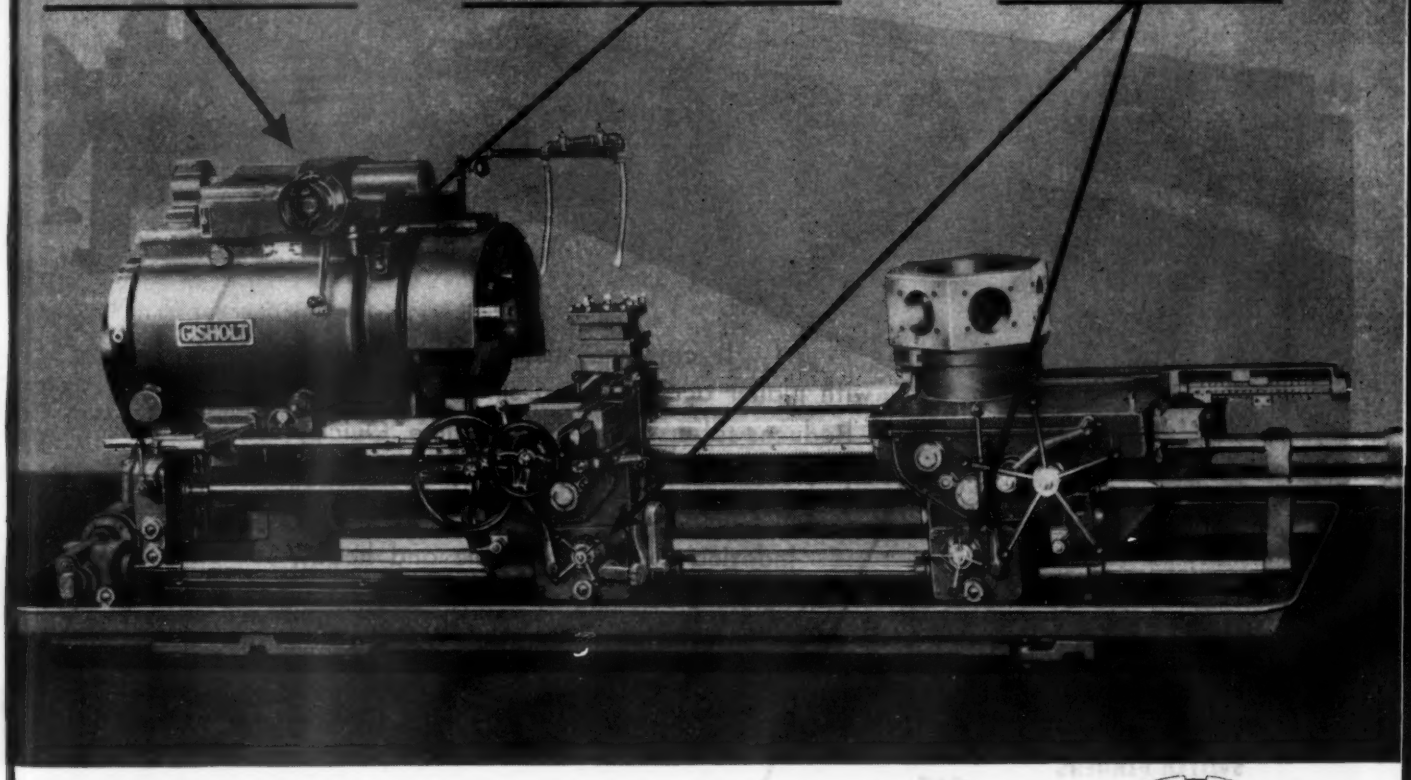
Easier Operation

HERE'S a 20,000-pound machine that requires no more operating effort than turret lathes approximately ⅓ its weight. Despite its great power and rigidity for heavy duty work, the new Gisholt 4L Saddle Type Turret Lathe is so fast and responsive it can handle light work of both large and small diameters. With many machine functions entirely automatic, waste time is eliminated. Fatigue is reduced to a new minimum. Training time is shortened. Operator output is faster—more nearly constant throughout the day.

1 Hydraulic speed selector eliminates manual gear shifting. Spindle speed changes are made instantly by power without stopping the spindle or releasing the main drive clutch. Can be operated either direct or pre-set.

2 Finger-tip touch to this single lever provides hydraulic control for starting, stopping, or reversing the spindle. No effort to it. Braking is automatic in neutral position, bringing the work quickly and smoothly to rest.

3 Easy selection of feeds is provided in the new single dial type feed selector control, making a complete choice of feeds immediately available. Aprons are fully enclosed. Automatic lubrication assures easy movement of carriage.



The new Gisholt 4L Saddle Type Turret Lathe provides 31⅜" swing over the ways; 27" swing over carriage wing and 63" longitudinal working travel of turret carriage to accommodate an unusually wide range of work. Ask Gisholt engineers about this modern, easier-operating Gisholt as applied to your specific machining requirements.

GISHOLT MACHINE COMPANY • *1201 E. Washington Ave., Madison 3, Wis.*

Look Ahead...Keep Ahead...With Gisholt Improvements in Metal Turning

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

GRAY *Milling Planer*

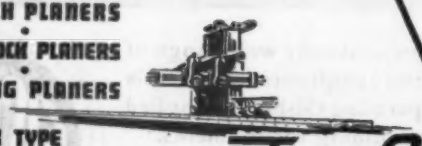
IT PLANES AND MILLS

IT BORES AND DRILLS

It combines milling machine speed with planer accuracy and simplicity of tooling. Reduces set-up time—cutting time. Quickly converted from Planer to Miller or vice versa. Can be equipped with Gray Automatic Precision Indexing Device for table and heads, for efficient machining of all types of jigs and fixtures. Adaptable to any job coming into your shop.

Bulletin 52 now available for complete information describing this machine, and its multiplicity of uses.

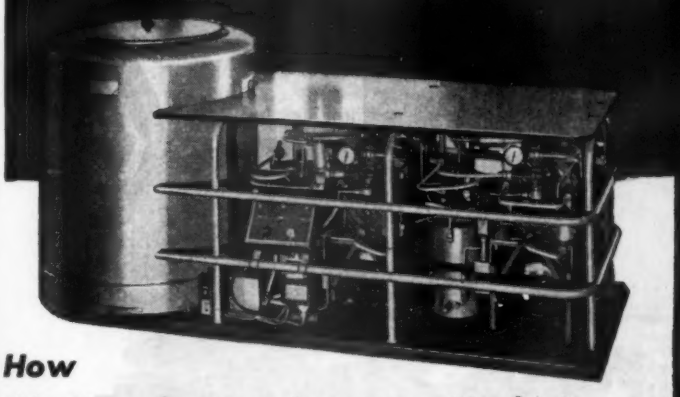
DOUBLE HOUSING and OPENSIDE PLANERS
•
SWITCH PLANERS
•
DIE BLOCK PLANERS
•
MILLING PLANERS
•
PLANER TYPE MILLING MACHINES
•
HORIZONTAL BORING MACHINES

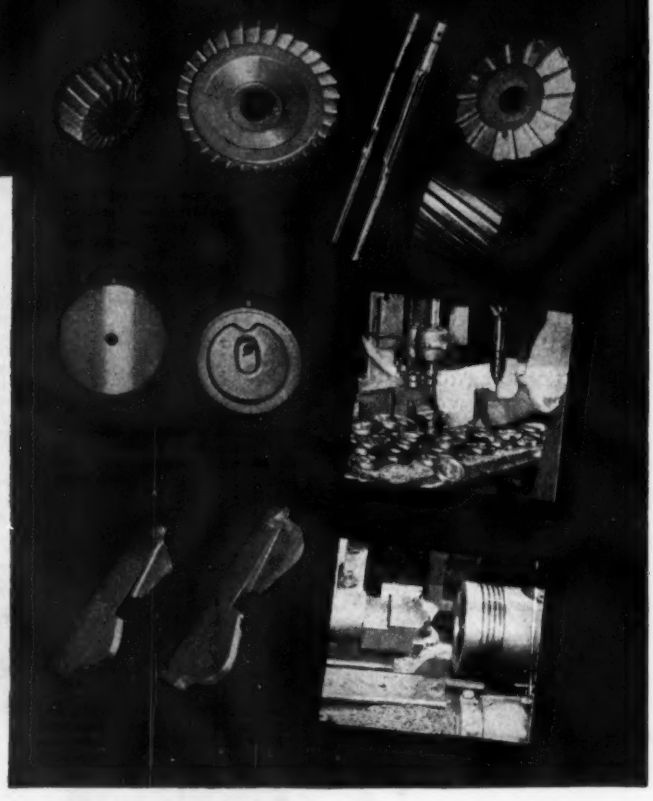


The G.A. GRAY *Co.*

CINCINNATI 7, OHIO, U. S. A.

3 to 1 increase in Tool Life





How this Manufacturer Improves Machining Efficiency by Cold Treating All Types of Cutting Tools Used in the Plant

This report shows how a large mid-western manufacturer tripled tool life, improved efficiency of machining operations and minimized machine down time by instituting a plant-wide program of cold treating all high-speed steel cutting tools.

Greater Tool Economy By Cold Treating

Prior to cold treating, frequent sharpening and breakage were common. It was therefore decided to subject a few tools to cold treatment. Results were outstanding; life of taps was increased in the ratio of 15 to 1 and special form tools 2 to 1.

This manufacturer now subjects all high-speed steel metal cutting tools to cold treatment in a Deepfreeze Industrial Chilling Machine before putting them into service. Here are the overall results—life of all tools is increased in the ratio of 3 to 1 with considerably less breakage, and a resulting decrease in machine down time. Efficiency of all machining operations is greatly improved.

Cold Treating Has Many Valuable Applications

The utility of cold treating is not limited to the treatment of cutting tools. It is employed with equally outstanding results for the following purposes: shrinking metal and shrink-fit assembly; stabilization of gauges and machine parts; testing of instruments and materials.

How Deepfreeze Engineering Service Can Help You

Our pioneering and extensive experience in the field of cold treating enables us to analyze your requirements and show how cold treating can be applied to your production. This service is offered without cost or obligation.

FREE...TREATISE ON COLD TREATING PROCEDURES

This 48-page Deepfreeze Technical Data Bulletin contains valuable information on Cold Treating Methods, procedures and results obtained by many of the nation's leading manufacturers. Also included are specifications on standard models of Deepfreeze Industrial Chilling Machines. Write today for your copy of this valuable Bulletin No. I-4.

TO MEET THE GROW

Precision Gear Hobbing

Lees-Bradner, pioneers in gear hobbing, developed the rotary hobbing process. Lees-Bradner Automatic Rotary Machines are furnished in four, six and eight spindles and each spindle may be arranged for the same job or for different jobs—climb or conventional cut. They are adaptable to the accurate hobbing of spur gears—helical gears—sprockets—spline shafts, etc. They are particularly suited to the mass production of accurate work at low cost. Write for full descriptive bulletins.

Lees-Bradner Hobbers are also furnished in single spindle type where production requirements do not warrant a multiple spindle machine.

ING DEMAND FOR
and Thread Milling

The SCT Chucking Type Thread Miller illustrated has capacity of

1. Swing over bed ways . . . 16"
2. Bore of work spindle . . . . 22"
3. Length of work spindle . . 36"
4. Maximum internal thread . 20" + dia. cutter
5. Maximum external thread . 20" — dia. cutter

The LT Model Thread Miller furnished in three sizes for chucking or centering type work, lengths up to 132" between centers, rated cutting capacity 1" circular pitch.

The HT Model Thread Miller for both chucking and centering type work, available in several lengths, with a rated capacity of 2½" circular pitch.

LEES-BRADNER
THREAD MILLER

Lees-Bradner developed the hob or ring type thread milling process for the production of precision threads in one and a fraction revolutions of the work. This method is accepted today as the fastest means available for the utmost in precision threading. These machines are suitable for either internal or external threading. Their acceptance by aircraft, automotive, armament and allied industries provides convincing proof of performance, production and versatility.

The LEES-BRADNER Company
CLEVELAND 11, OHIO, U.S.A.

DO YOUR JOBS CALL F

A Warner & Swasey power chuck wrench cut chucking time 68% on this irregular shaped piece

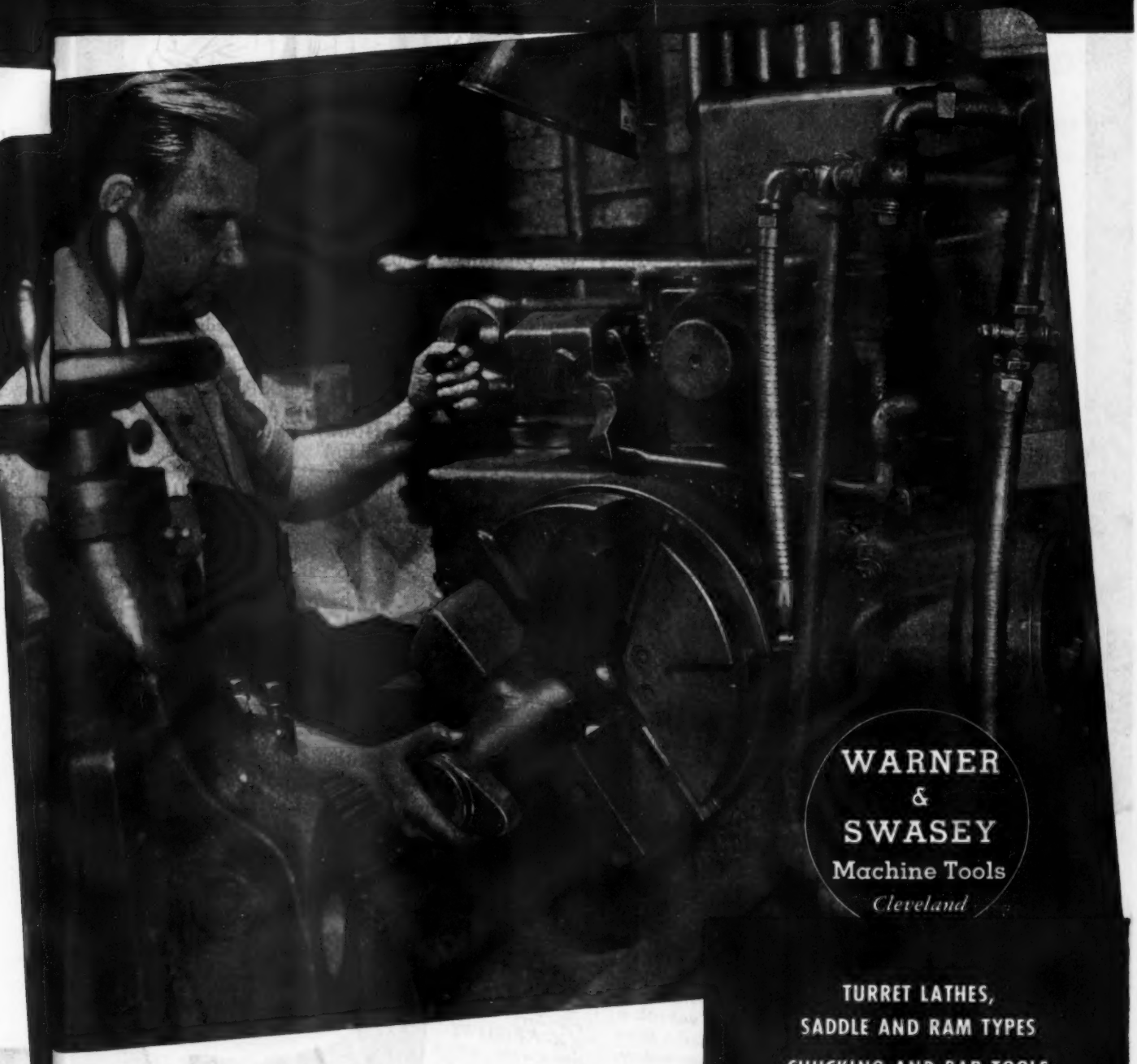
A GREAT many irregular pieces, like the heavy bracket shown here, require opening chuck jaws wide. In this case, a power chuck wrench added almost an hour's production time to each shift by relieving the operator of a long, tiresome hand chucking operation.

The large boss on the bracket made it necessary to open the chuck jaws more than an inch for each piece. Using a hand wrench, a good operator took 2½ minutes to make the 40 full turns required. When a power chuck wrench was installed, the chucking was done in 50 seconds—a saving of 1.7 minutes per piece!

If you have work that requires frequent chucking—or an unusual chucking condition such as the one pictured, let a Warner & Swasey Field Engineer show you how a Warner & Swasey power chuck wrench can boost production for you. Or call Warner & Swasey, Cleveland, Ohio, U. S. A.

YOU CAN MACHINE IT BETTER. FASTER. FOR LESS . . . WITH A WARNER & SWASEY

FOR WIDE OPEN CHUCK JAWS?



Note that the chuck jaws are wide open to accommodate the irregular shaped work piece.

WARNER & SWASEY
Machine Tools
Cleveland

TURRET LATHES,
SADDLE AND RAM TYPES
CHUCKING AND BAR TOOLS
PRECISION TAPPING AND
THREADING MACHINES

TAPPING TROUBLE? TYPICAL CASE SHOWS HOW ALERT "GREENFIELD MAN'S" QUICK SERVICE SOLVES PROBLEM

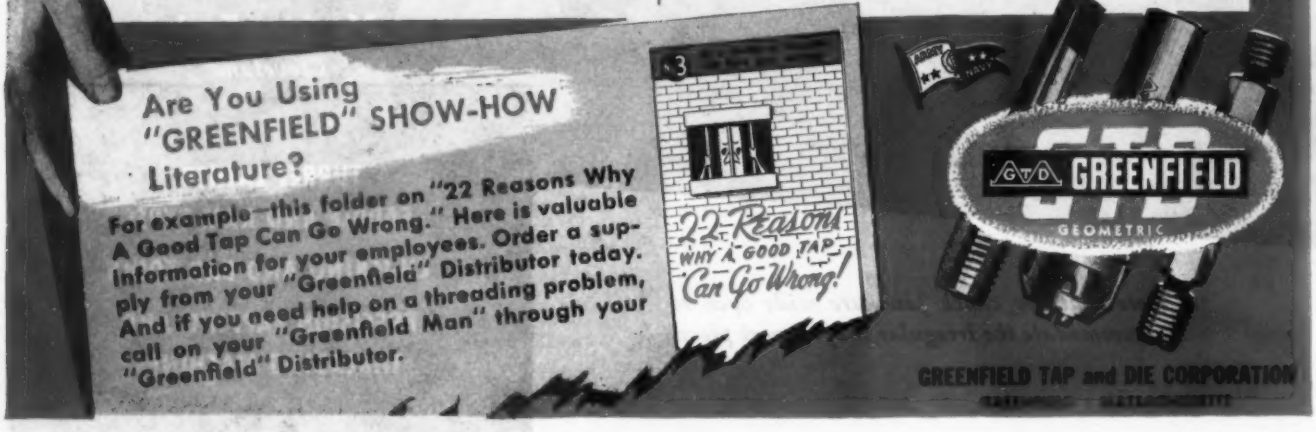
[A GTD SHOW-HOW REPORT]

1 A small southern plant, wrestling with new war order calling for close threading tolerances, was having trouble getting Class 3 fits. In re-ordering taps from "Greenfield," they mention problem in foot-note on the order, wondering if job calls for a "special" tap.

2 The "Greenfield" home office writes immediately for complete data needed to help customer with problem. Copy of correspondence automatically goes to "Greenfield Man" in customer's territory. "Greenfield Man," familiar with customer's tapping operation, suspects something other than the tap is causing the trouble. He visits plant immediately.

3 Customer shows him the tapping operation which is causing the trouble. "Greenfield Man," checking various factors which might affect accuracy, discovers tap and work are out of alignment, and suggests how to correct trouble.

4 Result . . . customer is able to get Class 3 fits with no difficulty and without the "special" taps he thought might be needed. His problem is solved—in a few days—thanks to alert, resourceful service from "Greenfield's" field organization.


Are You Using "GREENFIELD" SHOW-HOW Literature?
For example—this folder on "22 Reasons Why A Good Tap Can Go Wrong." Here is valuable information for your employees. Order a supply from your "Greenfield" Distributor today. And if you need help on a threading problem, call on your "Greenfield Man" through your "Greenfield" Distributor.
22 Reasons WHY A GOOD TAP Can Go Wrong!
GTD GREENFIELD GEOMETRIC
GREENFIELD TAP and DIE CORPORATION

IT'S SO SIMPLE

to cut ACCURATE threads from 1/16" to 3 1/4" diameter with GEOMETRIC Rotary DIE HEADS

Simple and "fool-proof" in construction — easy to use, easy to re-sharpen — yet a light, compact, sensitive precise tool that will cut from 1/16" to 3 1/4" diameter —

That's the essence of the reasons why GEOMETRIC Rotary DIE HEADS have proved so popular for use on live spindle machines, especially automatic screw machines.

Note the simple, compact design of the head — no awkward adjusting screws — no stop levers — perfectly balanced.

Another important feature — note how the chasers protrude through the front of the head so they can cut close to a shoulder without having to remove the face plates.

Simplicity is the key to the increasing trend toward the use of GEOMETRIC Die Heads — saving time and expense in operation, re-sharpening and replacements.

GEO MET RIC

Built in two types—Style KD for the coarser pitches—Style CK for the finer pitches. Write for a FREE Booklet on this tool

The GEOMETRIC TOOL COMPANY

It is seldom that you see such a large battery of boring mills of one make in a single installation.

However this display of King Vertical Boring and Turning Machines gives evidence of the versatility —productivity—and satisfaction they give you on the various types of work to which they are adapted.

King Boring and Turning Machines have the stamina to produce 24 hours a day—speed and feed range to meet varying operating conditions—rigidity to maintain precision tolerances over long periods.

For speed—accuracy—high production—and all around adaptability put your precision boring—turning—facing and similar work on a KING.

***KING BUILDS** Vertical Boring and Turning Machines exclusively—single column types from 30" to 42"—double column types from 52" to 12 feet.*

– TURNING
– BORING
– FACING

Are a few of the operations being performed on this battery of . . .

KING

VERTICAL BORING & TURNING MACHINES

THE KING MACHINE TOOL COMPANY

CINCINNATI 32, OHIO

BUILDERS OF VERTICAL BORING AND TURNING MACHINES EXCLUSIVELY

TWO SEPARATE OPERATIONS.....
IN THE TIME REQUIRED FOR ROUGH MILLING — *ALONE*

The NEWTON MILL-N-SHAVER

COMBINATION UNIT HEAD MILLING AND SHAVING MACHINE EQUIPPED WITH TWO SINGLE VERTICAL MILLING HEADS AND TWO FINISH SHAVING HEADS. HYDRAULIC FEED TO TABLE.

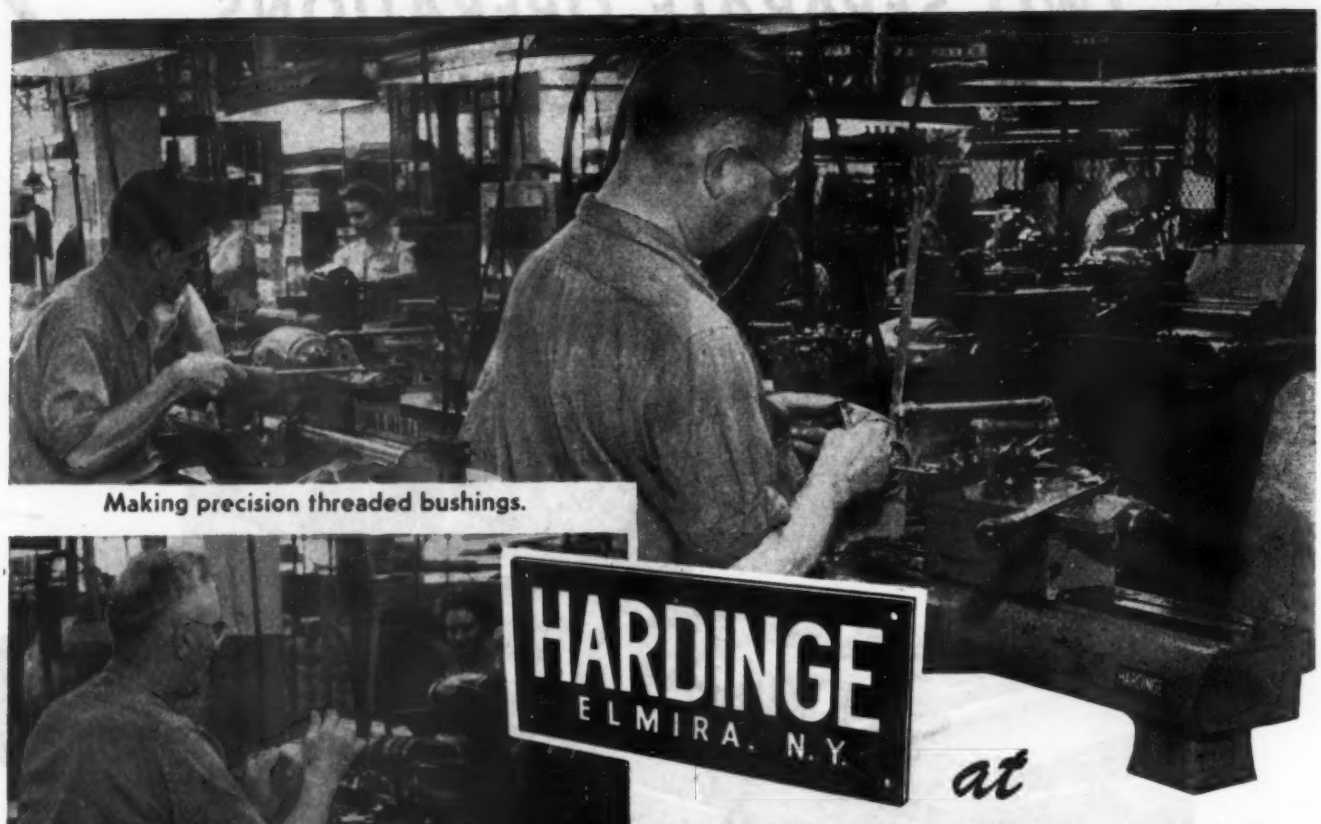
The Newton Mill-N-Shaver performs two complete operations at one pass of the table. It rough mills at milling speed and finish shaves on the return, at the rapid traverse speed. This machine produces a perfect gasket surface . . . two separate operations . . . in exactly the time ordinarily required for rough milling alone. The Newton Mill-N-Shaver is designed to both step-up your production and reduce your costs on the types of work for which this machine is adapted. For detailed information, write for Bulletin No. 580.

BETTS • BETTS BRIDGEFORD • NEWTON • COLBURN • HILLES & JONES • MODERN

CONSOLIDATED MACHINE TOOLS

CONSOLIDATED
MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK



Making precision threaded bushings.

Turning angle face of generator rings to length.

Facing retaining rings.

HARDINGE
ELMIRA, N.Y.

at

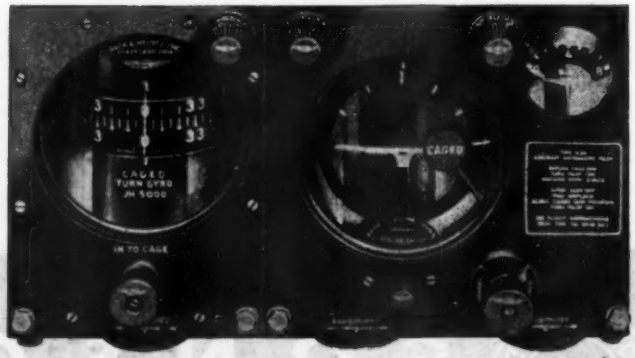
JACK & HEINTZ, Inc.

Since 1917 Bill Jack has been heading companies which manufactured precision parts, so it was only natural that Hardinge lathes were selected for precision operation at Jack & Heintz, Inc. of Cleveland.

Jahco now manufactures automatic pilots, flight instruments, engine starters, generators and other aircraft units requiring high precision tolerances customarily being inspected to a few ten-thousandths. Some parts of these instruments are more delicate than a watch yet Jahco makes them on a volume production basis.

Hardinge precision lathes have played their part in permitting such accuracy with the necessary speed to meet high production schedules. No plane has ever been held on the ground for lack of a promised Jahco unit. No less than twenty Jahco units are made for the new Boeing B-29 Superfortresses.

HARDINGE BROTHERS, INC.
ELMIRA, N. Y.



Jahco automatic pilot which keeps the plane level and on the course set.

Alcoa Aluminum, as it comes from the machine, offers neat appearance and considerable resistance to corrosion. Quite often, this natural finish is sufficient, saving you the cost of an extra operation. Where desirable, however, aluminum can be given various other finishes. Sales appeal of your products is increased because of their finer appearance and added resistance to abrasion and corrosion. For example:

Mechanical finishes—Polishing, buffing, hammering, sand blasting, satin finishing, burnishing, all produce very attractive results. Also, they form the foundation for other decorative or protective finishes.

Chemical finishes—Obtained by various chemical processes, these finishes are inexpensive and require a minimum of equipment. Some may be used for their protective value or as a surface preparation for paint, others for decorative use.

Electrolytic finishes—These hard, corundum-like anodic coatings are among the most durable. They are attractive, highly resistant to corrosion and abrasion, and may be colored by dyes and mineral pigments.

Electroplating—Bright chromium, nickel and oxidized silver, brass and copper, all give fine appearance. The hard chromium plates give high resistance to wear; silver plated aluminum improves conductivity and parts can be soldered.

For data on finishes for aluminum, write ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh 19, Pennsylvania.

**Because of aluminum's lighter weight, you get three times as many pieces per pound.*

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

COLLETS *with Character*

A RIVETT DRAW-IN COLLET has personality derived from a worthy inheritance and a steadily improved environment. Today when a RIVETT COLLET is shipped in its distinctive carton it reflects fifty years of experience and the most advanced methods in manufacture and inspection.

RIVETT DRAW-IN COLLETS are available in all standard styles for bench lathe, engine lathe, miller and grinder use. Work held in a RIVETT COLLET is guaranteed to run "dead true" at the collet mouth and within .002" two inches from the collet mouth. For complete information on all RIVETT COLLETS and their adaptation to existing machines write for Bulletin 100.

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RIVETT

RIVETT LATHE & GRINDER, Inc.
BRIGHTON • BOSTON • MASS. • U. S. A.

One ten-thousandth of an inch does count in aircraft engines—and Staples Expansion Reamers are accurate right down to that fourth decimal place. That's why the Staples Piloted Expansion Reamer is used to attain uniform precision accuracy in multiple hole reaming operations in building Pratt & Whitney Wasp engines. And also why Staples, within a few years of its organization, was manufacturing 90% of all carbide reamers used in aircraft engine work.

Today Staples, because of its greatly expanded facilities, can supply reamers and other carboloy-tipped circular cutting tools to every producer who needs and appreciates aircraft accuracy in his finished parts. *Standard tools in stock*—special tools designed on request. Write for catalog and full information.

Staples Tool & Engineering Company
Cincinnati 25 . . . . . Ohio

Staples CARBOLOY-TIPPED CIRCULAR CUTTING TOOLS

REAMERS • CORE DRILLS • SPOT FACERS • COUNTERBORES • END MILLS • SHELL END MILLS • ALSO A COMPLETE LINE OF CIRCULAR SPECIAL TOOLS

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Los Angeles, Machinists' Tool & Supply
Memphis, J. E. Dilworth
Minneapolis, John C. Eide
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Norfolk, Empire Machinery & Supply
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Toledo, Mill & Factory Supply
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Waterbury, White Supply
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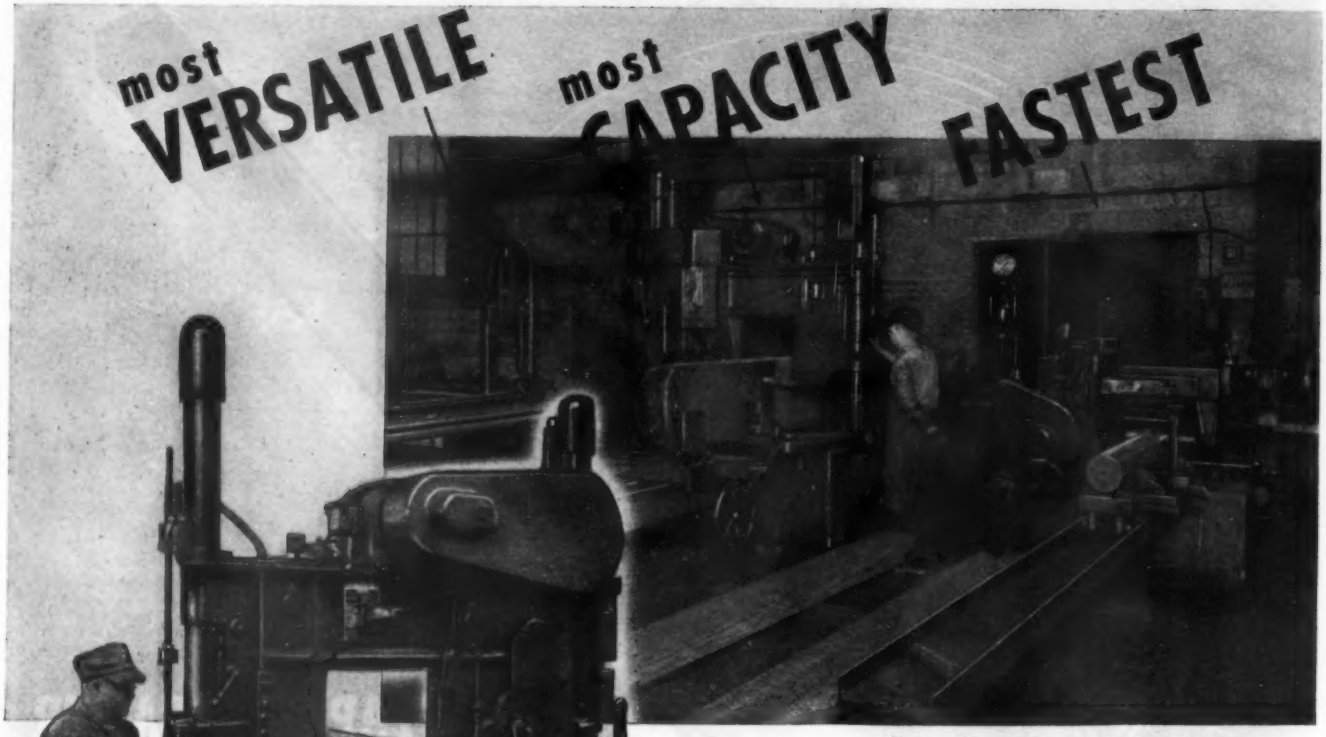
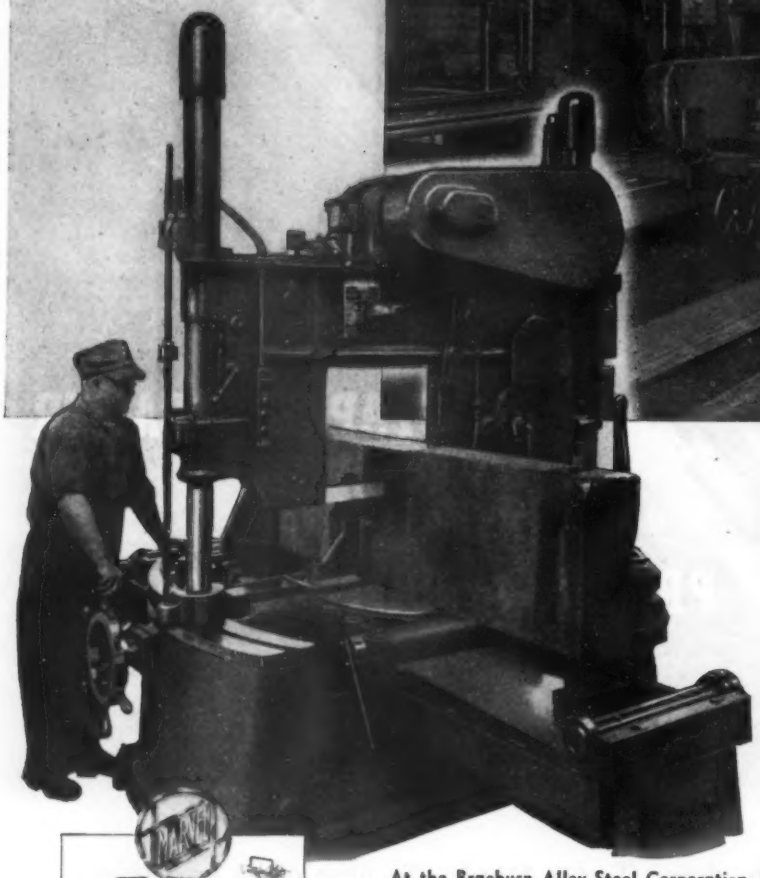
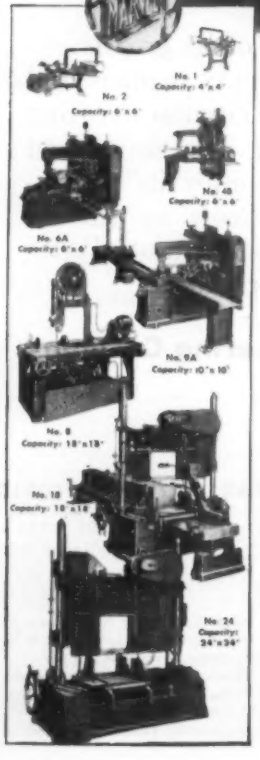
most VERSATILE most CAPACITY FASTEST





EACH *first* IN ITS CLASS



At the Braeburn Alloy Steel Corporation, Braeburn, Pennsylvania, there is a lot of steel to be cut—not only in tonnage but in types of steels, variety of cuts and range of sizes. Still the Braeburn Corporation can give prompt cutting-off service on any order, whether it be for a single tool steel flat, a thousand gear blanks or a giant die block (up to 18" x 18" cross section). They have equipped their cutting-off department to handle every type cutting-off job with a MARVEL No. 8 Metal-cutting Band Saw, by far the most versatile saw built; a MARVEL No. 9A Automatic Production Saw, by far the fastest saw; and a MARVEL No. 18 Giant "sister" the MARVEL No. 24 (capacity 24" x 24"), is the largest capacity hack saw built. With this battery of modern sawing equipment this firm gets the utmost in Speed, Accuracy and Economy, no matter what the job calls for. Furthermore, because of the automatic features of these saws, one operator takes care of all 3 of them.

No matter what your sawing needs, from the most inexpensive dry cutting shop saw to the largest capacity giant, there is a MARVEL Saw exactly suited to your needs and it's the best saw of its type.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 W. Bloomingdale Ave. **Chicago 39, U. S. A.**

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

MARVEL SAWS

SHELL PLANT

A marked improvement in machining practice through the use of Gulf Lasupar Cutting Oil led to a large increase in production and 200% longer tool life.

AIRCRAFT PARTS PLANT

Through the use of Gulf Cut-Aid, this plant stepped up production of aluminum caps for aircraft 25%, increased tool life over 100%, and obtained better threads.

SHELL FUSE PLANT

This machine formerly drilled and tapped 700 parts per hour. Now with Gulf Cut-Aid production is more than 1,000 per hour—an increase of over 42%.

Gulf Quality Petroleum Products

can also help you solve your postwar production problems!

THESE WAR PLANTS, like many others, have found that Gulf quality petroleum products have helped them do an outstanding job!

Increased production, less bearing wear, longer tool life, better finishes on machine parts, improved rust prevention, lower maintenance costs—benefits like these from the use of Gulf industrial oils and greases are reported by plant operating men from Maine to New Mexico.

If you have a problem that involves the use of a petroleum product, Gulf is well prepared to give you effective help in finding the solution. For the Gulf organization combines knowledge and skill in the manufacture of petroleum products with broad, practical experience in their proper selection and application.

Call in a Gulf Service Engineer and get the benefit of his helpful counsel. His recommendations may enable you to improve production—both in quality and quantity—and make dollar savings in maintenance costs. Write, wire, or phone your nearest Gulf office today.

GULF INDUSTRIAL LUBRICATION

Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices:
Boston · New York · Philadelphia · Pittsburgh · Atlanta
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Helps machines produce more at lower cost

THREE QUINTALS ARE A CRUSHING LOAD!

Such penetrating observations as the one he made about tools moved readers to dub Thomas Carlyle the Sage of Chelsea. He observed: "Man is a Tool-using Animal. Weak in himself, and of small stature, he stands on a basis—of some half square foot, insecurely enough; has to straddle out his legs, lest the very wind supplant him. Feeblest of bipeds! Three quintals (336 pounds) are a crushing load for him; the steer in the meadow tosses him aloft like a waste rag.

"Nevertheless he can use tools, can devise tools. With these the granite mountain melts into light dust before him; the seas are his smooth highway; the winds and fire his unwearying steeds. Nowhere do you find him without tools; without tools he is nothing, with tools he is all".

May we add that the "man" at Vulcan can "devise tools" exceptionally well. With Vulcan tools you may be "all" in your line of endeavor.

The VULCAN TOOL Co.

730 LORAIN AVE.
DAYTON 10, OHIO

WRITE FOR THIS

ENGINEERING PROCESSING DESIGNING BUILDING
TOOLS DIES JIGS GAUGES SPECIAL MACHINERY

Surface Broaching in the Automotive Field

★ Surface broaching is being increasingly used to reduce machining costs of duplicate metal parts that must be made in large quantities to close tolerances. In the automotive field there are many opportunities of applying surface broaching at remarkable savings over present methods. Due to the high production obtained (up to 2000 pieces per hour on many parts) direct labor costs are kept low, and because surface broaching cutting speeds are low (about 30 to 35 feet per minute) tool maintenance costs are kept at a minimum. It will pay to investigate Footburt surface broaching methods. Send us blueprints and information on production requirements.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

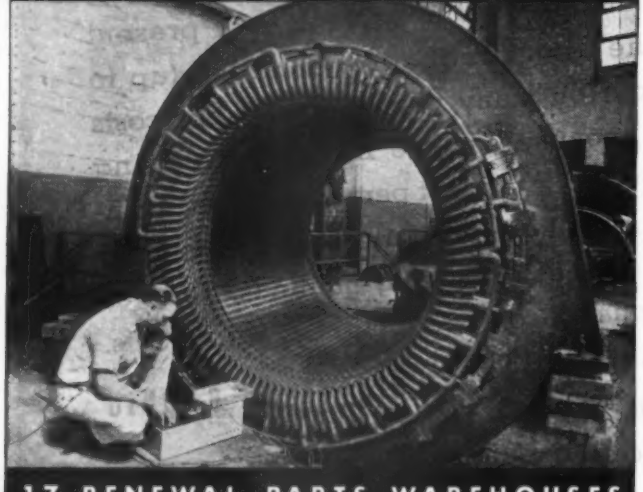
Detroit Office: General Motors Building

MOVE UP THE SCHEDULE ☆ WIN THE WAR QUICKER

Footburt Patented Tooth Form

FOOTBURT *Surface Broaching*

Bring your plant up to par



1. *FOR ELECTRICAL AND STEAM REPAIRS.* Local Westinghouse Manufacturing and Repair Plants are especially equipped to repair, remodel or recondition your electrical machines or apparatus. This service includes rewinding motors, generators and transformers; rebuilding commutators; replacing or building up worn parts such as shafts, frames, brackets and other steel parts. Special testing equipment is used for dynamic balancing, high-frequency testing and similar precision operations.

Each repaired machine or piece of apparatus bears the "Factory-Proved" tag, which is a guarantee that the job was done by factory-trained men, using factory-proved methods and quality materials.

2. *FOR ENGINEERING HELP.* For major electrical and steam repairs, there are Westinghouse engineers near you with wide experience on repairing such equipment. They are prepared to diagnose your electrical and steam troubles, give you emergency repair service, and help you with engineering problems.

3. *FOR RENEWAL PARTS.* Prompt delivery of standard renewal parts can be obtained from your closest Westinghouse Renewal Parts Warehouse. Stocks on hand include parts normally subject to wear or burning, such as contact tips, shunts, arc chutes, operating coils, armature and field coils, bearings, etc.

Westinghouse Renewal Parts are carefully made by skilled workmen, using the same precision machines, methods and materials used in manufacturing original equipment.

Electrically..

TO SPEED RECONVERSION

USE THIS

3-way Maintenance Service

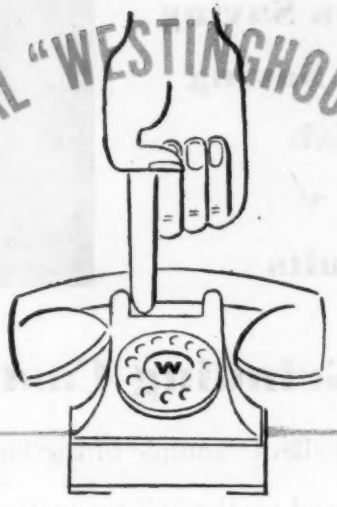
THAT HAS PROVED ITS VALUE IN SCORES OF WAR PLANTS

Westinghouse Maintenance Service is a nationwide service... as close as your telephone. It brings you faster, better, longer-lasting electrical repairs to keep your equipment at peak productive efficiency, plus a consulting service by experienced engineers.

If electrical machines or apparatus in your plant need reconditioning or rebuilding—or if you wish to speed reconversion—this 3-way Westinghouse Maintenance Service is prepared to help with your problem.

Back of this service are years of experience in handling electrical and steam equipment repairs for practically every industry. This experience is supplemented by a continuous program of research in one of the world's largest laboratories to find new techniques and better materials for maintenance work. When Westinghouse handles your repairs, you benefit from a wealth of practical experience, plus the latest developments of science.

For full information, call your nearest Westinghouse office. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-96003



FOR COMPLETE MAINTENANCE SERVICE

In addition to experienced engineers, factory-trained repairmen and complete repair plant facilities, Westinghouse has special machines and test equipment, plus genuine Westinghouse Renewal Parts . . . all available for your electrical and steam repairs.

For prompt service, phone your nearest Westinghouse office and ask for "Maintenance".

KEEP YOUR ELECTRICAL EQUIPMENT UP TO PAR WITH...

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

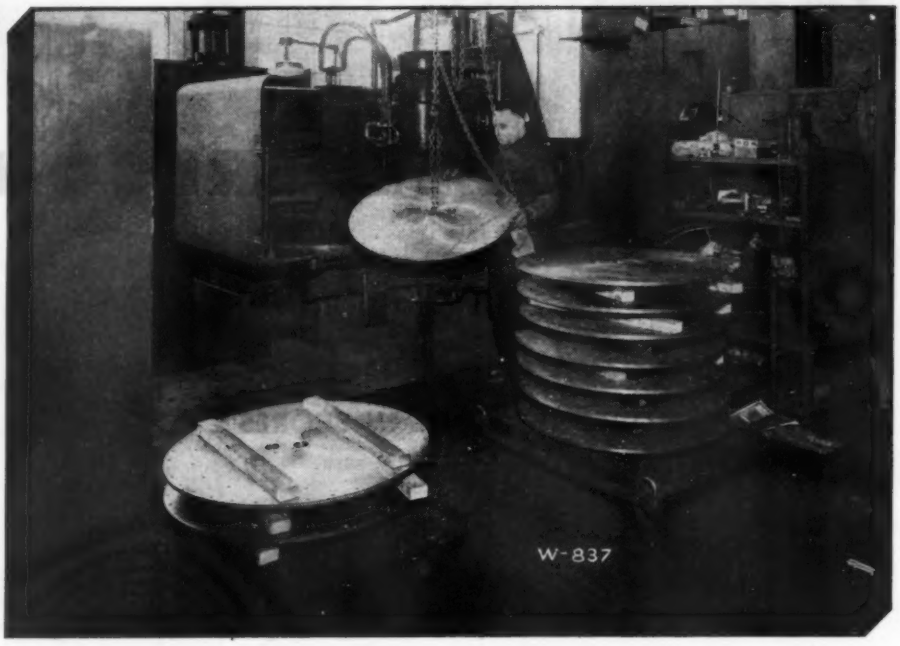
Maintenance Service

REPAIRS • PARTS • ENGINEERING

"Put it on the Blanchard"

...GET THESE ADVANTAGES

Production ✓
Adaptability
Fixture Saving
Operation Saving
Material Saving
Fine Finish
Flatness ✓
Close Limits



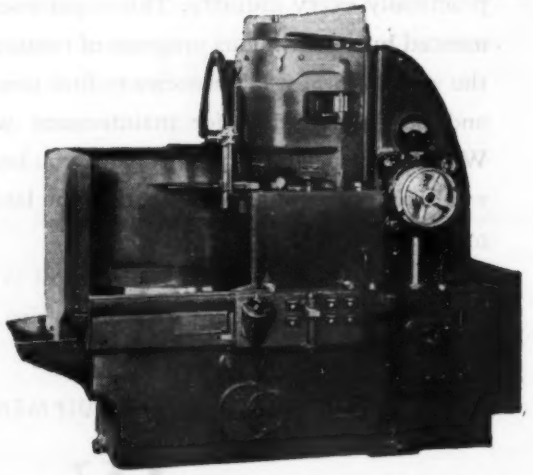
Grinding Cast Iron Bottom Plates

This is an excellent example of the large work that can be easily ground on the 36" magnetic chuck of the No. 18 Blanchard Surface Grinder.

Three of these 36" cast iron bottom plates are ground per hour removing $^{1}/_{32}$" of metal on one side, within .0005", to make a watertight joint without gaskets.

Whether the piece is large or small there is less setting-up time and greater accuracy when you "put it on the Blanchard".

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.



No. 18 BLANCHARD SURFACE GRINDER

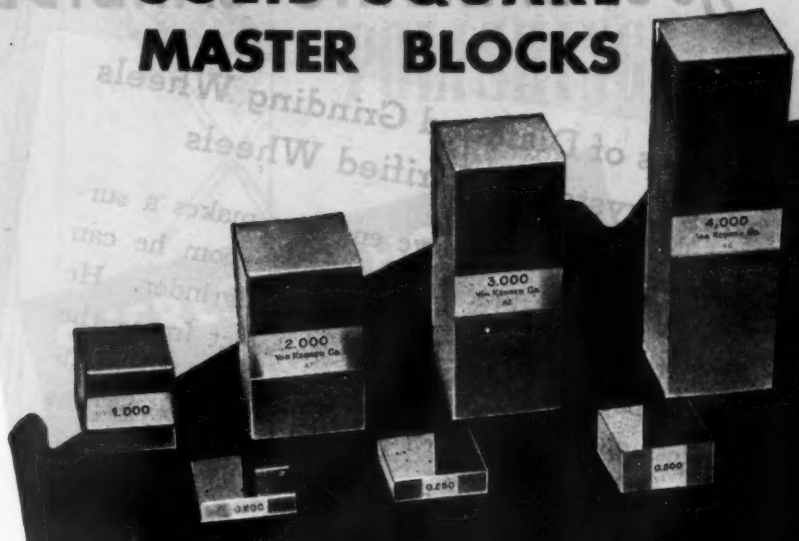
BLANCHARD

The BLANCHARD MACHINE COMPANY

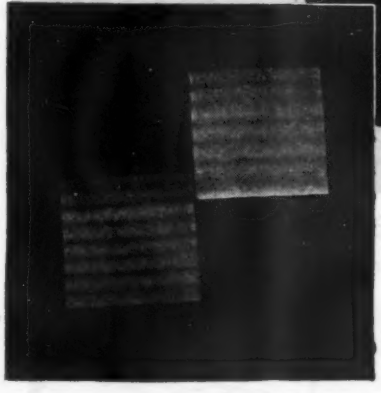
64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

Van Keuren

SOLID SQUARE MASTER BLOCKS



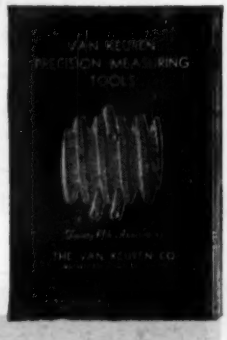
The Perfect Reference Standard For Your Post War Requirements



Comparison of two Solid Square Master Blocks for length, flatness, and parallelism with light waves. Note the straightness, parallelism, and even spacing of the bands on both blocks showing perfection well within the guaranteed accuracy of 4 millionths of an inch. These blocks are ideal standards for making measurements with light waves.

The perfect gage block should be square in order to obtain stability and the best distribution of wearing surface. It should be solid in order to have uninterrupted flat and parallel measuring surfaces. The material should be steel, the best obtainable, in order to secure proper expansion characteristics, maximum wearing qualities, resistance to corrosion, and permanency. These requirements are fulfilled in Van Keuren solid square master blocks. They have six times the life of ordinary blocks and are as nearly perfect as 25 years of experience in manufacturing gage blocks can make them.

A limited number of 41 and 84-block sets are available for quick shipment. Ask for prices and delivery dates. Send for new 160-page Van Keuren Handbook No. 33.



THE Van Keuren CO., 176 WALTHAM ST., WATERTOWN, MASS.

Light Wave Equipment—Light Wave Micrometers—Gage Blocks—Taper Insert Plug Gages—Wire Type Plug Gages—Measuring Wires—Thread Measuring Wires—Gear Measuring System—Shop Triangles.

NORTON *has Complete Service for* GRINDING CARBIDE TOOLS

Three Types of Diamond Grinding Wheels plus Crystolon Vitrified Wheels

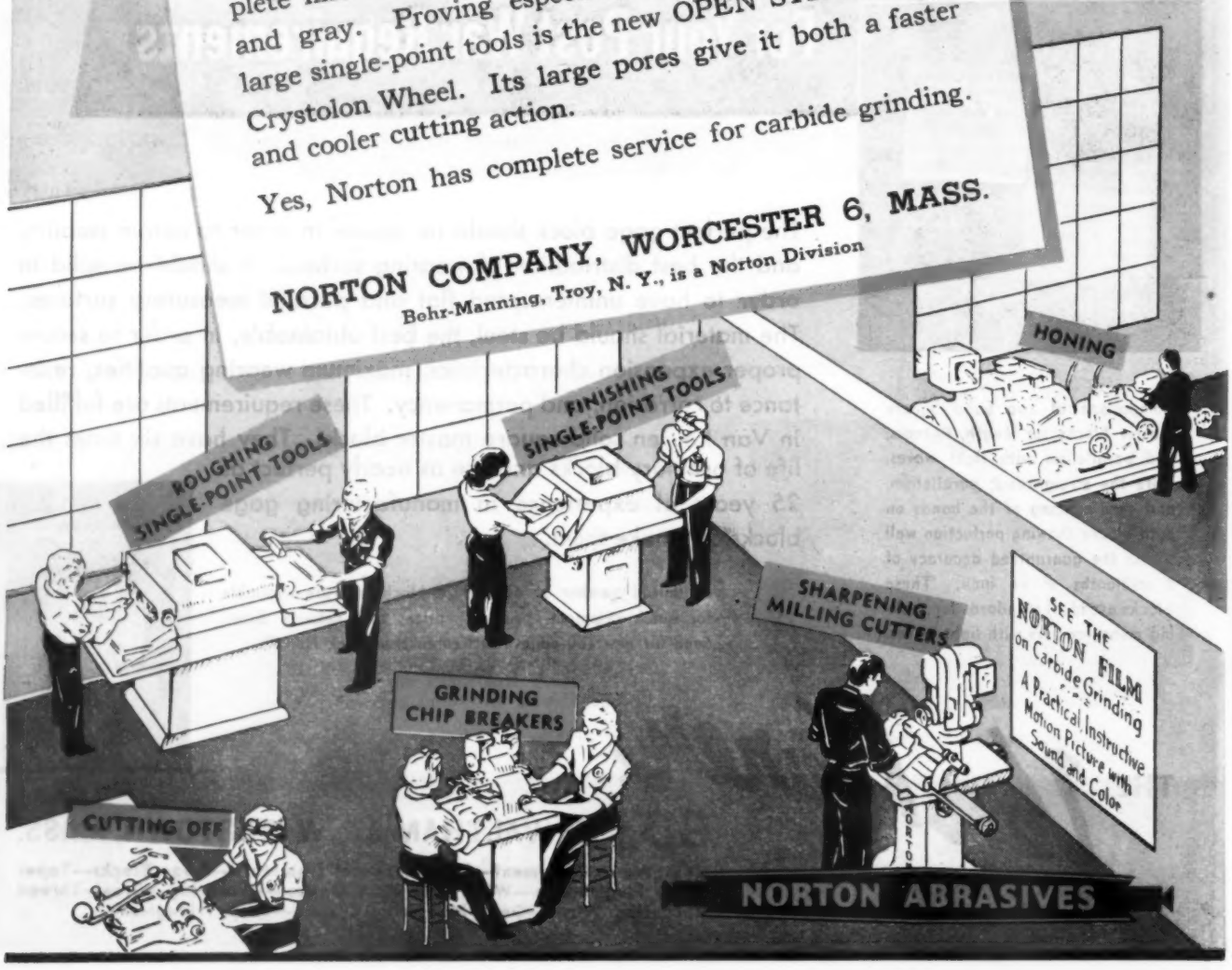
WHEN the Norton abrasive engineer makes a survey of your carbide tool grinding room he can supply just the wheels you need for *every* grinder. He has *three types* of diamond wheels to select from—the Norton Resinoid Bonded, the Metal Bonded and sensational new Norton Vitrified Bonded. Each type has its rightful place—is best for certain grinding jobs.

For the rough grinding of carbide tools he has a complete line of wheels of Crystolon abrasive—both green and gray. Proving especially popular for sharpening large single-point tools is the new OPEN STRUCTURE Crystolon Wheel. Its large pores give it both a faster and cooler cutting action.

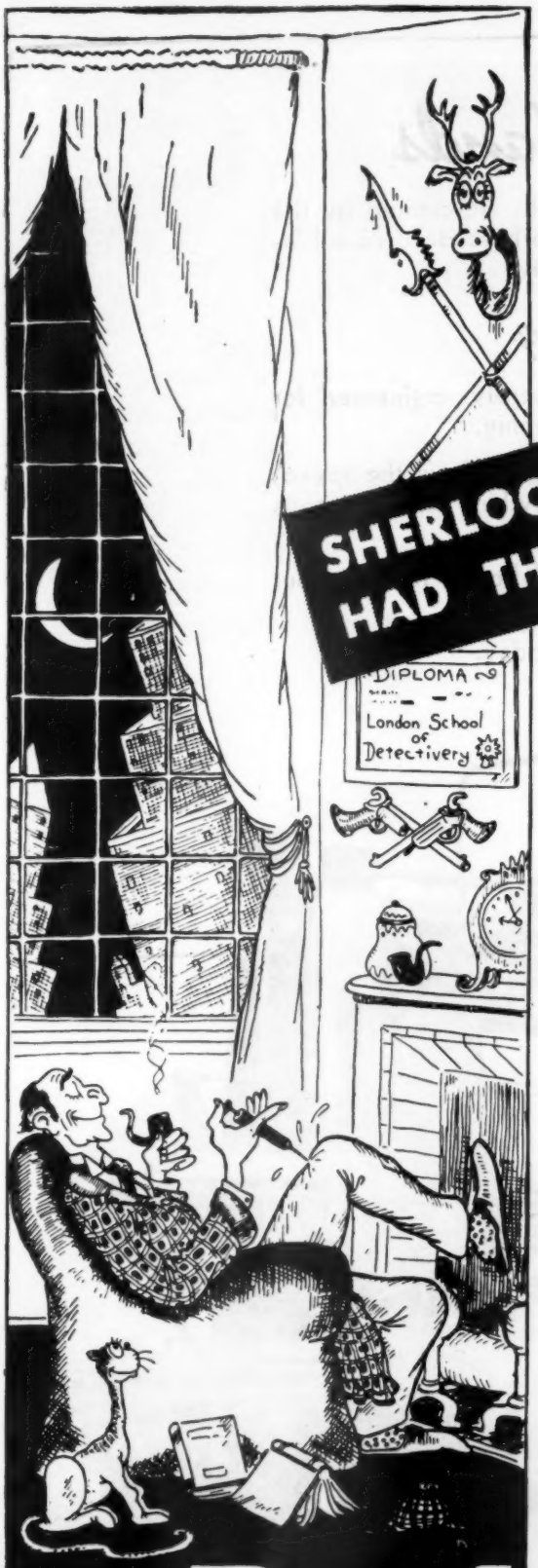
Yes, Norton has complete service for carbide grinding.

NORTON COMPANY, WORCESTER 6, MASS.

Behr-Manning, Troy, N. Y., is a Norton Division



FOR *Automatic* POLISHING AND BUFFING



SHERLOCK HOLMES HAD THE "DOPE"...

Sherlock Holmes' successful career in the detection of crime was due entirely to his uncanny ability to make correct deductions. We, too, have made a deduction . . . of a different kind, but equally successful. We have deducted most of the hand labor from polishing and buffing . . . and, believe us, the amount of labor these operations required really WAS a crime.

Speed-up Production. Lower costs on your difficult to finish parts. There's a PACKER-MATIC for all shapes, metals and finishes. WRITE for Factory Time Study — SEND Part and finish desired.

No. 2-12 ROTARY INDEXING TYPE

Packer-Matic

THE PACKER MACHINE CO., MERIDEN, CONN., U. S. A.

Skilled Hands

Cincinnati Hypro Vertical Boring Mills are created by the skilled hands of master machinists who have devoted a lifetime to producing boring mills that have

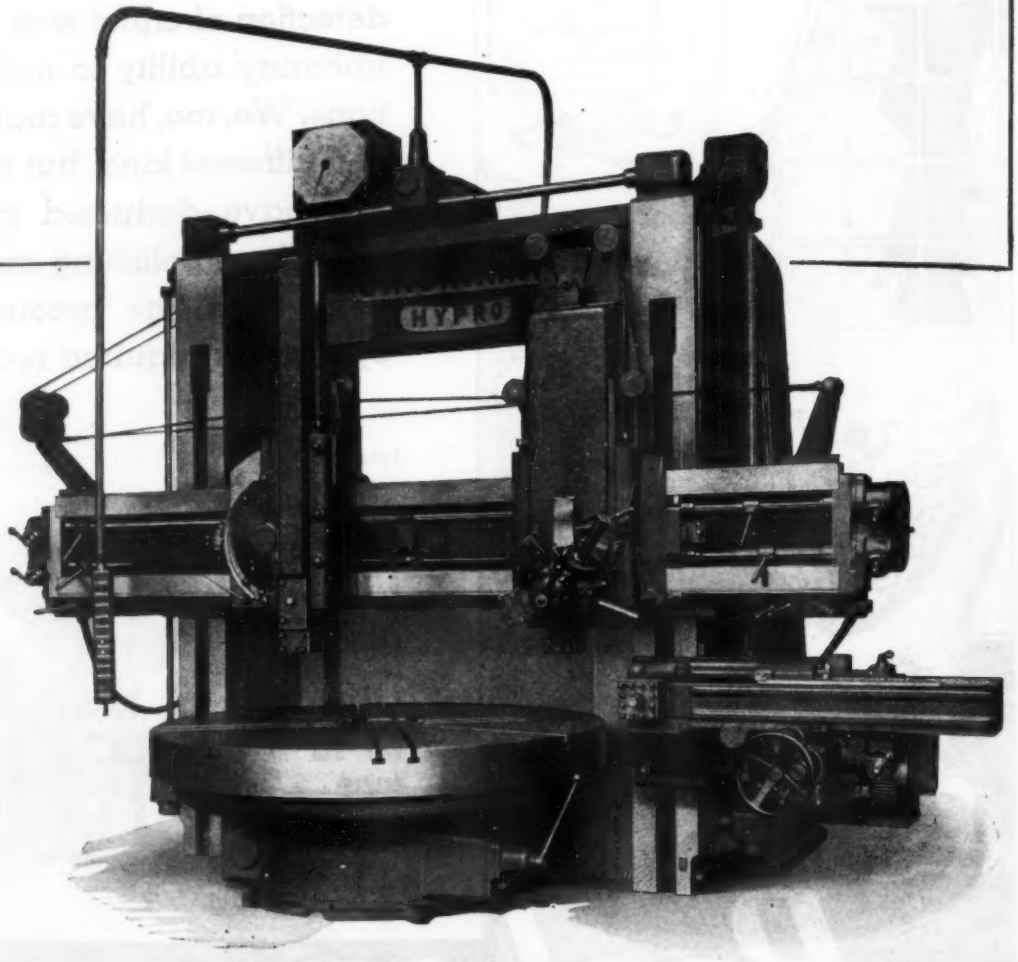
Everything

They are scientifically designed, superbly engineered for all types of heavy duty boring and turning.

These famous precision built boring mills have the speed, strength, power, rigidity—in fact everything to lower costs and increase profits.

Consider a Cincinnati Hypro Vertical Boring Mill in your post war planning.

Write for Bulletin **A. M.-132—175 today.**



Sizes—54" to 12', inclusive, and 12' to 18' Extension type.

THE CINCINNATI HYPRO PLANER COMPANY

PLANERS · BORING MILLS · PLANER TYPE MILLERS

CINCINNATI, OHIO

P & J EQUIPMENT CAN BE RE-TOOLED . . . FOR FURTHER LOW-COST PRODUCTION

The need for cost-cutting in the era which lies ahead can be met with existing P & J equipment, because P & J design is such as to facilitate re-tooling. Thus a P & J machine, such as the 6 DRELX shown here tooled for machining brake drums, can be readily changed over for producing any other parts which come within the scope of its capacity. The new work will be handled at minimum cost.

Practically every P & J machine now in service offers an opportunity to be of further, low-cost productive use. Now is the time to consider the part your P & J equipment can play *profitably* in your reconversion program. P & J engineers are at your command to help you re-tool to greatest advantage.

"U. S." Stands for "UNCONDITIONAL SURRENDER" Buy More BONDS

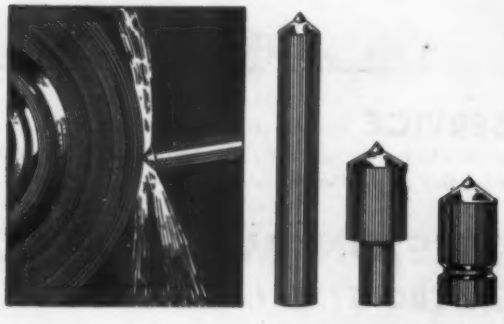
P & J REBUILDING SERVICE Owners of P & J Automatics are invited to investigate P & J's plant facilities for rebuilding their machines to original accuracy and productivity. Re-tooling can be conveniently handled at the time of rebuilding.

POTTER & JOHNSTON MACHINE CO.

PAWTUCKET, R. I.

There's more than meets the eye . . . in DESSAU DIAMOND TOOLS

Dessau Diamond Tools may bear an *outward* resemblance to other diamond tools but from that point on, the similarity ends. In *Dessau* Diamond Tools, it's what you *can't* see that counts *most*—the meticulous, personal care with which Dessau Diamonds are selected—the masterly analysis of each tool's individual task—and above all, the 104 year record of reliability which stands squarely behind every Dessau Diamond Tool in action!



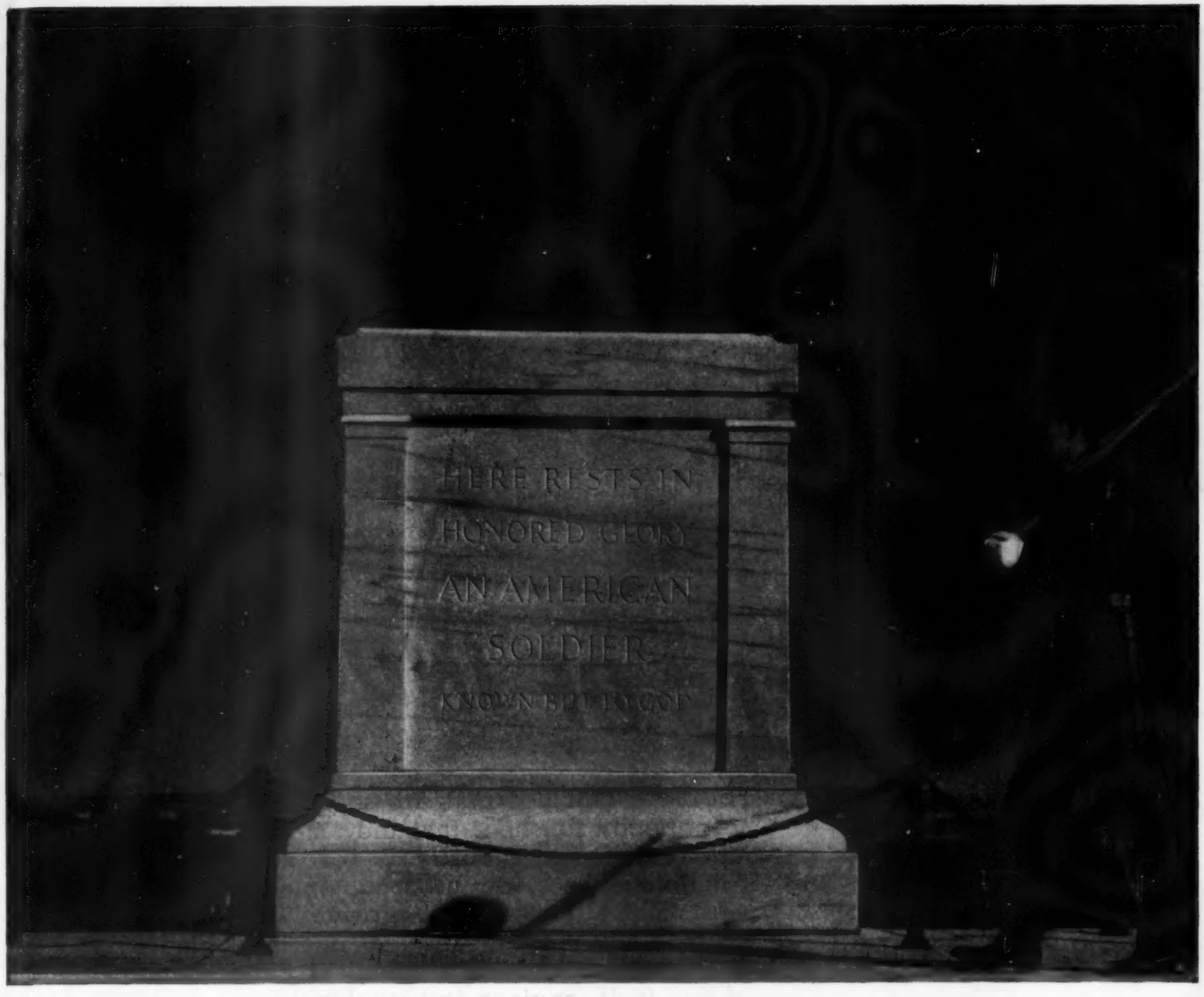
MAURICE S.

DESSAU

COMPANY

★ *Diamond Tool Manufacturers* ★

535 Fifth Avenue • New York 17, N.Y.



What kind of monument to the Unknown Soldier's son?

Here stands one of the most hallowed monuments in the world . . . and one of the most tragic.

For this American soldier died that the world might be safe for his son.

And his son was killed.

We propose a different kind of monument to this second generation unknown.

America now is more powerful than all the rest of the world.

More powerful in thought . . . A single American magazine today, printed in 11 languages, outsells any other publication in 53 countries of the world. People are eager for American ideas.

More powerful in armament . . . We have twice the air-power, and from two to four times the naval strength of the rest of the world totaled together. People respect American might.

More powerful in wealth . . . Over half the earth's total capacity to produce is here in our plants, machinery and skills. People need the things that America can produce.

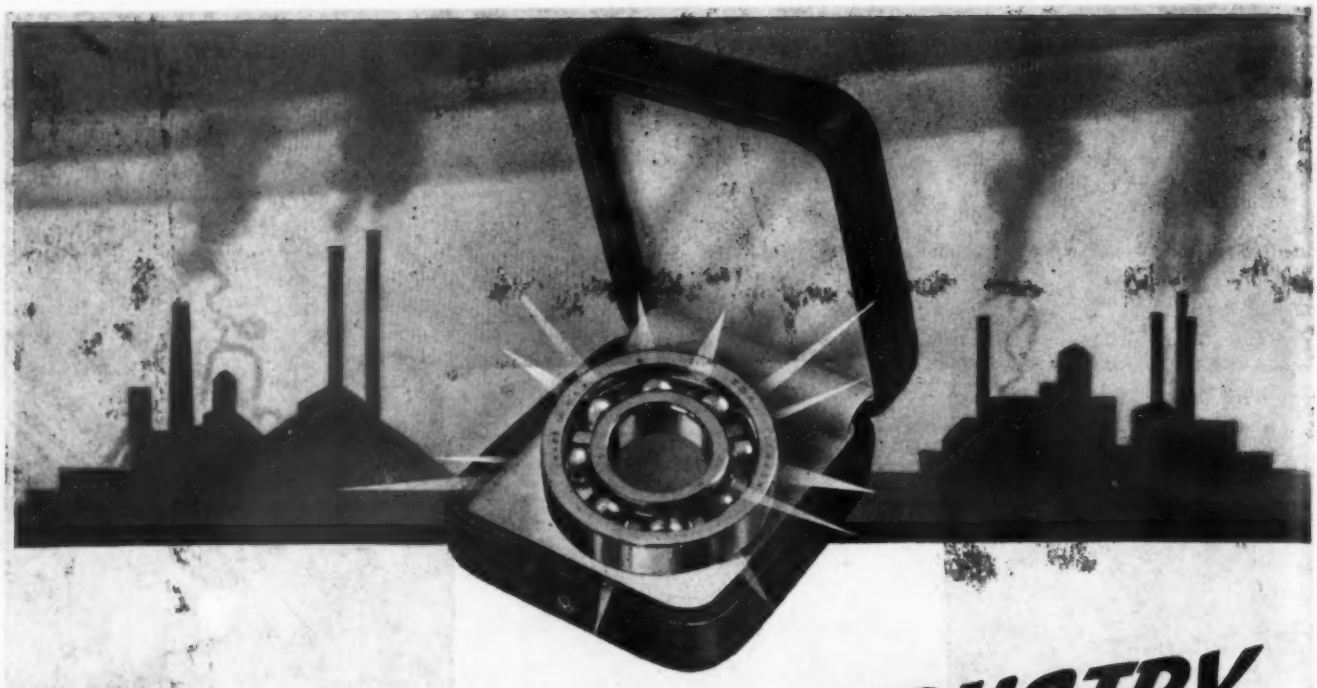
This stupendous power can break down the barriers of ignorance, intolerance and want. It can keep our nation strong. It can *enforce* decency and peace upon the world. Ours is the chance and the responsibility to set an example for all the peoples of the earth to see.

This would be a monument.

The engineers of the basic machine tool producers can help the men of government and of industry to build that monument . . . to plan now the reconversion of our power to all-out production for a better world.

One of these engineers is a Bryant man. We urge you to call him in today.

COMPANY SPRINGFIELD VERMONT, U.S.A.



THE JEWELS OF INDUSTRY

FEDERAL Ball Bearings are so carefully made, so perfectly finished, that they may be called "the Jewels of Industry." For many years, Federals have been used in America's foremost motor cars: they provide dependable control for combat and commercial planes and contribute to the frictionless performance of fine tools, engines and machinery.

FEDERAL

PRECISION BALL BEARINGS

SPECIFY FEDERAL BALL BEARINGS FOR YOUR PLANT OR PRODUCT

THE FEDERAL BEARINGS CO., INC.

Makers of Fine Ball Bearings

POUGHKEEPSIE, N. Y.

REPRESENTATIVES LOCATED AT

Detroit: 2840 Book Tower—26 • Cleveland: 402 Swetland Building—15
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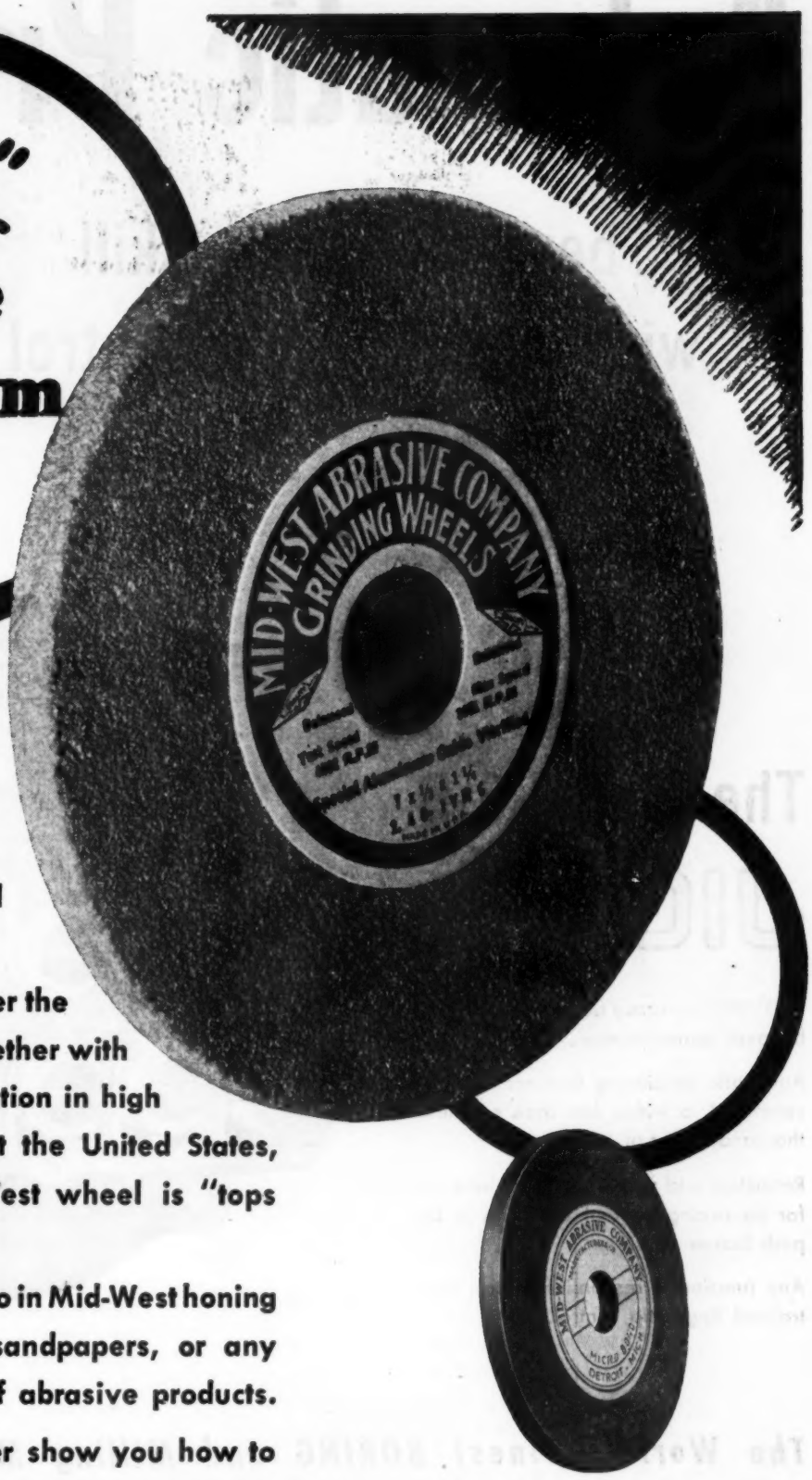
"Tops" for the Tool Room



The new tool room grinding wheel of the Mid-West Abrasive Company clearly shows its superiority in high speed tool steel operations.

Test after test, conducted under the most rigorous conditions, together with many months of actual operation in high production plants throughout the United States, demonstrate that the Mid-West wheel is "tops for the tool room."

You'll find this exemplified also in Mid-West honing stones, sharpening stones, sandpapers, or any of Mid-West's broad range of abrasive products.

Let a Mid-West field engineer show you how to solve your abrasive problem.

MID-WEST ABRASIVE CO.

Manufactures of DEPENDABLE Abrasives

Owosso, Mich. • Detroit • Rochester, Pa.

Automatic Precision

. . . beyond human skill with push-button control

The Model 3-B JIGMIL

PROVIDES accuracy beyond human skill by push button control.

Automatic positioning between holes is controlled to within less than one ten-thousandth part of an inch.

Retraction and repositioning of the work for measuring or tool changing is by push button operation.

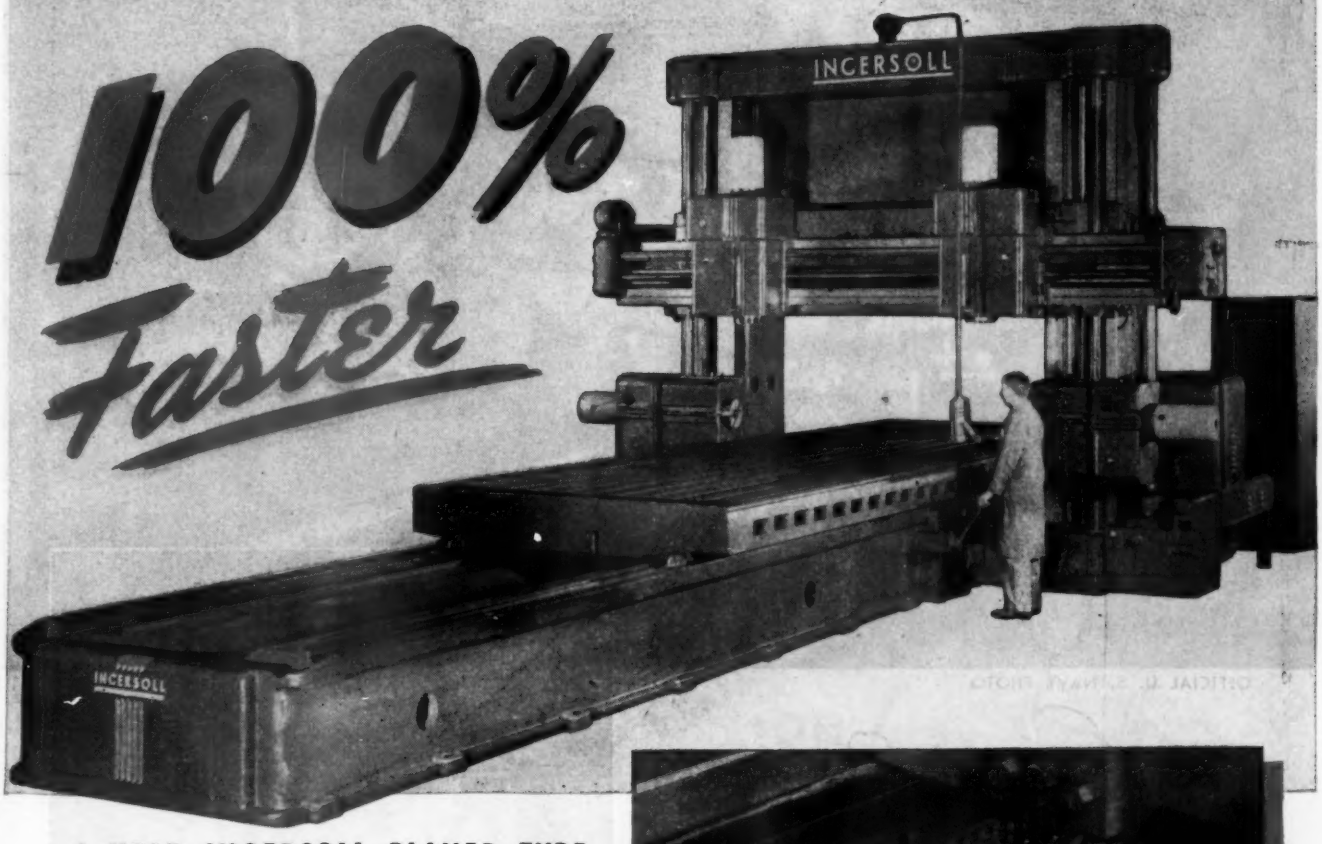
Any function is responsive to this centralized finger tip control.

The World's Finest BORING and Milling Machine

DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL **450 FAIR AVE. FERNDALE 20, (Detroit) MICH.**

HEAVY MILLING

100% Faster

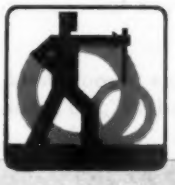


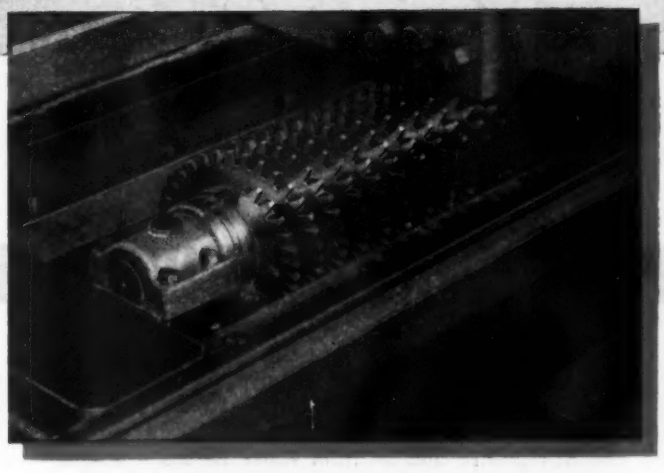
4 HEAD INGERSOLL PLANER TYPE MILL (108" x 78" x 26')

One of this country's leading tool manufacturers uses the above machine to mill frame castings.

The three largest castings that required a total of ninety-five hours to machine are now milled in fifty hours — an average saving of approximately two to one.

Fifty horse power is available for driving any individual spindle or combination of the four spindles that may be needed for a particular job. Although the machine can thereby utilize fast, modern cutters in the heaviest cuts, it is easily operated by pushbutton control at the point of cut through the Ingersoll Patented Pendant.



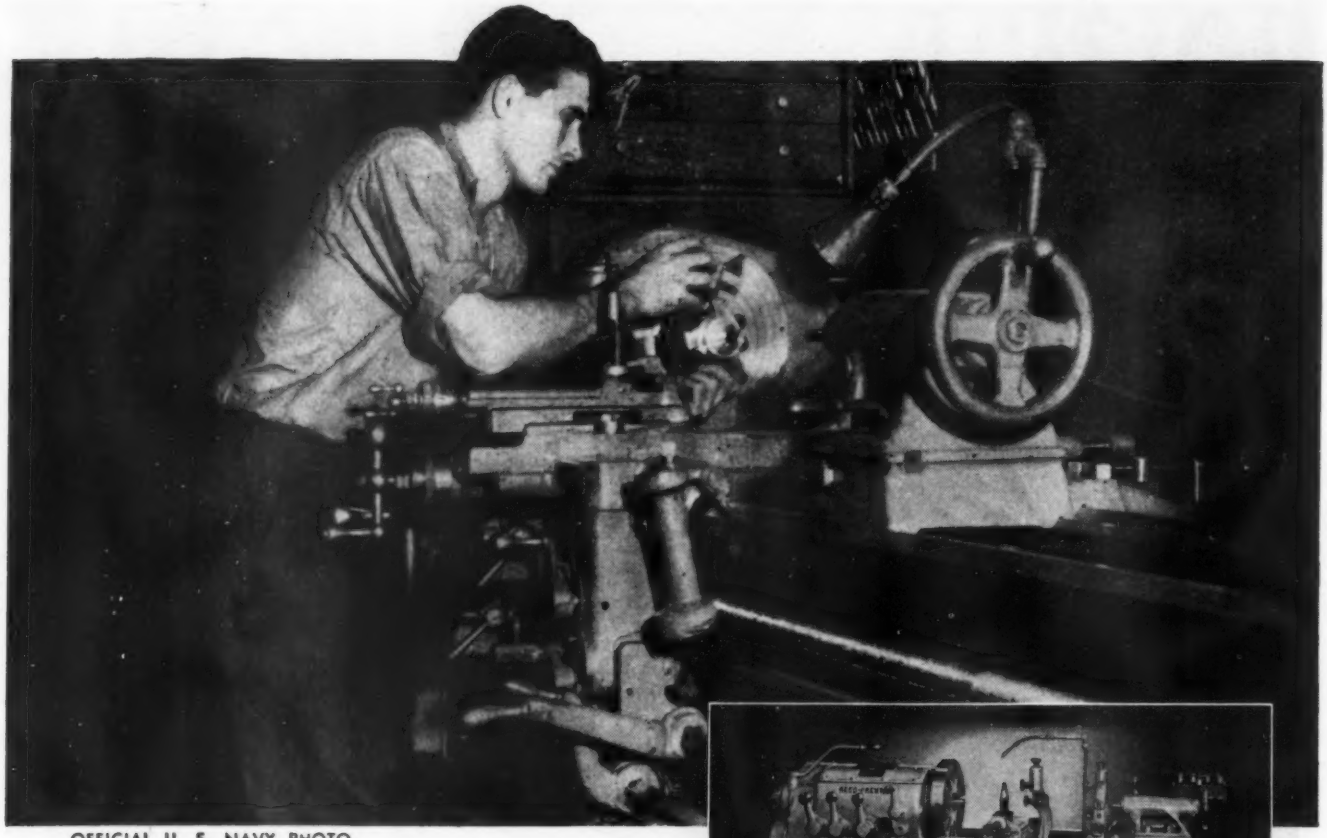


The Patented Johnson Drive mechanism gives smoother drive to the table because of maximum tooth contact of the rack, under perfect lubricating conditions, without long shafts to deflect.

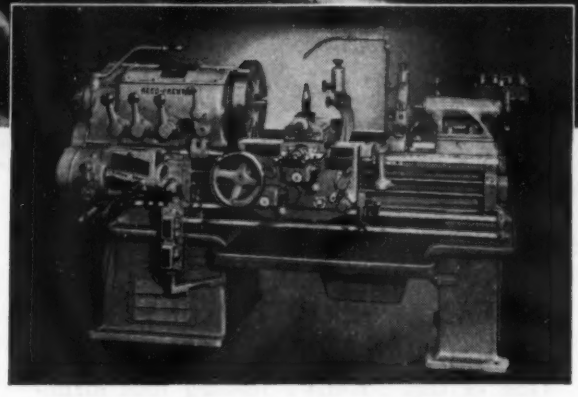
THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILLINOIS

INGERSOLL

SPECIALIZED MILLING, DRILLING, BORING, TAPPING, SCALPING MACHINES



OFFICIAL U. S. NAVY PHOTO



PREFERRED PERFORMANCE *in the Pacific!*

The power supply of one of our "battle-wagons" was endangered "somewhere in the Pacific" — when a plunger cylinder for an extractor cage (which removes grease and oil from water before it enters the boilers) had to be replaced — at once!

No spares aboard — a REED-PRENTICE 14" lathe, (similar to model illustrated) was pressed into emergency service — and repairs were quickly accomplished (see official Navy photo).

A report (released by the Navy for publication) reads: "This is but one example of dozens of jobs the machine does . . . it is one of the most important units in the ship's machine shop. Since it was installed in December 1937, it has given excellent service."

REED-PRENTICE machine tools have been giving this same reliable service to the production battle on the home front, as well as to our Armed Forces — ample proof of their peace-time record for dependable and diversified performance.

Write for complete information about Reed-Prentice 14", 16" and 20" engine and 14", 16" toolroom lathes today!

★ ★ ★ ★ ★

MACHINE TOOLS

REED-PRENTICE CORP.

WORCESTER MASS., U.S.A.

★ ★ ★ ★ ★ ★ ★ ★ ★

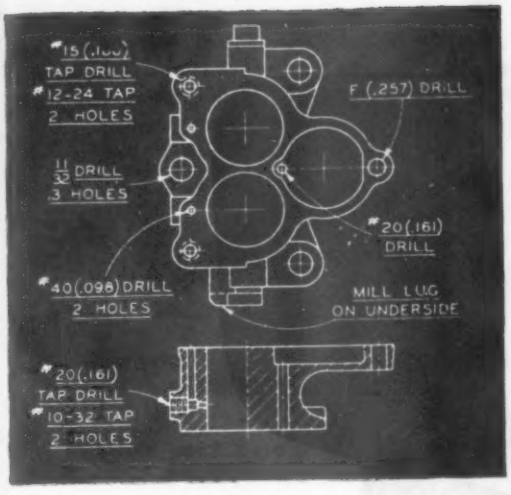
NEW YORK OFFICE: 75 West St., New York 6, N. Y.

CLEVELAND OFFICE: 1213 W. 3rd St., Cleveland 13, Ohio

FLEXIMATIC

The THRIFTY Way

To Solve Production Problems



THIS IS A FLEXIMATIC JOB!

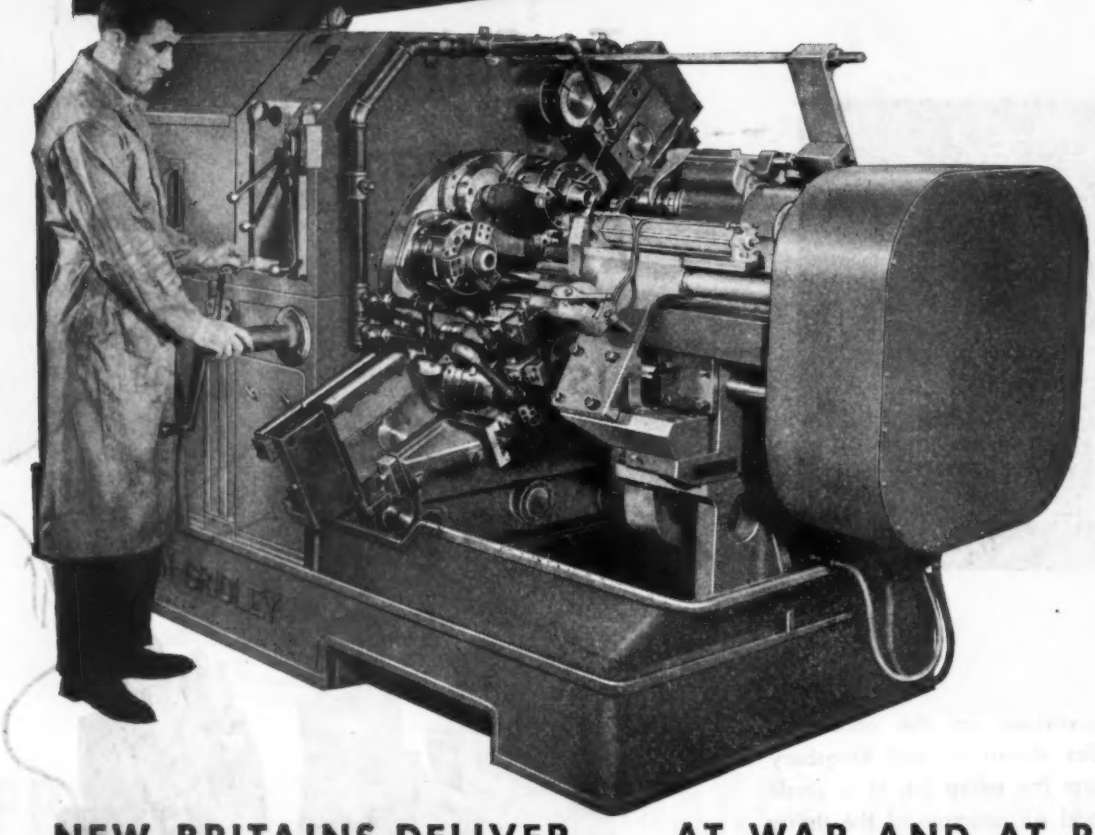
Over a dozen operations on the carburetor throttle valve bodies shown — and Kingsbury FLEXIMATICS perform the entire job in a single chucking of the work! An example of the thrifty way to solve multiple - operation production problems.

FLEXIMATICS are built up of standard Units, set up on a standard base around an automatically indexing work-holding turret. This unit system of construction keeps first costs low—out of the "special machine" class. And in addition, FLEXIMATIC Units can be changed, moved around and mounted in any combination on the base to meet the machining requirements of many different parts. That is why we say that **flexible automatic** FLEXIMATICS are the THRIFTY way to solve production problems.

KINGSBURY MACHINE TOOL CORPORATION

KEENE NEW HAMPSHIRE U.S.A.

LEADERSHIP
PROVED BY HUNDREDS OF CASE HISTORIES . .



NEW BRITAINS DELIVER . . . AT WAR AND AT PEACE

The automatic chucking machine business had its inception in the heart of Connecticut in the year 1911. Basic designs and operational features met with immediate success, for here was new speed and production of efficiency.

New Britain chuckers built in 1911 were years ahead in functional design and application, and extensive research coupled with advance engineering has kept them way out in front . . . to cope with mass production methods and keen competition.

New Britains' ability to speed up production of essential ammunition parts and equipment proved of great importance back in '18. During the era of industrial development that followed World War I, American initiative and ingenuity accounted for many refinements in design . . . to meet rigid specifications, quality and quantity production demands.

Today, the Army-Navy "E" award and three continuous performance stars are evidence of New Britain Machine's outstanding contributions to achieve a decisive Victory in World War II . . . a combination of the best in men, machines and materials to produce the ultimate in multiple spindle bar and chucking machines.

NEW BRITAIN AUTOMATICS

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT
NEW BRITAIN-GRIDLEY DIVISION

M-01617

...Here's One

Extensive metallurgical research is resulting in new manufacturing economies while turning out higher quality parts and products. The motor end frame is one of several typical jobs employing an alloy in preference to cast iron.

The aluminum alloy part presented an extreme chucking problem due to its 6.741" diameter and fragile 1/8" section. The selection of New Britain 88's proved to be the solution. Twenty-two (22) well-placed tools in eight positions are required to completely machine the rough casting . . . a part every 11.8 seconds. The machines are running 574 R.P.M. and produce 305 motor end frames per hour.

FIRST POSITION
Load in two-jaw hydraulically operated chucks.

SECOND POSITION
Face end of skirt from cross arm — Core Drill .7775 diameter — Rough turn 6.738 diameter. Face end of hub.

THIRD POSITION
Core drill 1 1/8" diameter and 15/16" diameter. Rough turn 1.330 diameter.

FOURTH POSITION
Single point bore .7775 and 1 1/8" diameters. Rough turn 1.433 diameter.

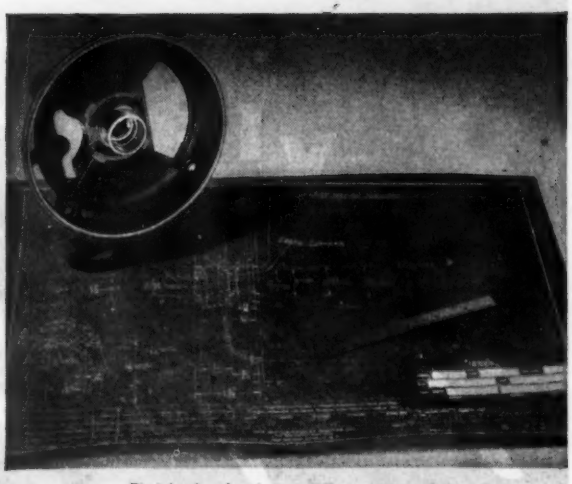
FIFTH POSITION
Single point bore .7775 and 1 1/8" diameters and chamfer 1 1/8" diameter. Semi-finish turn 6.738 diameter.

SIXTH POSITION
Finish face side of skirt from cross arm. Rough recess both grooves.

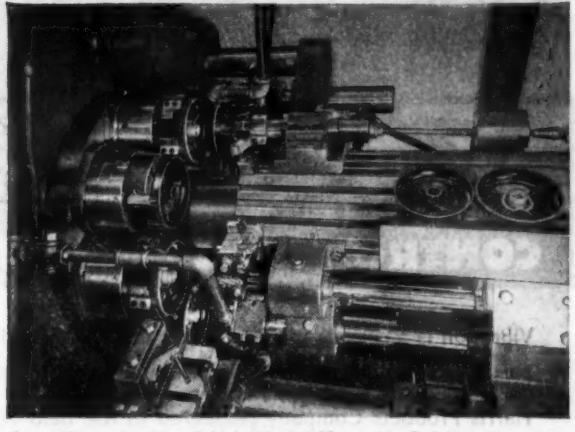
SEVENTH POSITION
Finish recess both grooves.

EIGHTH POSITION
Ream .7775 diameter — Finish turn and chamfer.

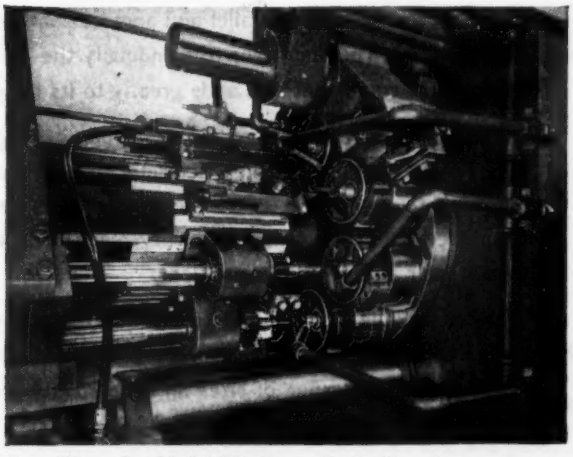
This difficult machining of an aluminum alloy motor end frame is but one of many outstanding applications of New Britian automatics . . . bar and chucking machines that are establishing new records daily for accurate and economical production. To manufacture your peacetime quality product at less cost . . . machine it on a New Britain multiple spindle automatic.



Finished Aluminum Alloy Motor End Frame machined to exacting tolerances.



Front View of a New Britain Model 88 used in finishing the motor end frame . ... Note accessibility through open end construction.



Rear View of a Model 88 shows relationship of cross arms to toolslide . . . permitting more efficient tool layout and production.

The New Britain machine line includes four, six and eight multiple spindle automatic bar machines up to 2¼" capacity. Also a wide range of four, six and eight multiple spindle automatic chucking machines up to 12" capacity.

VIBRATION

Plague OF ALL MOVING PARTS

Torflex Flexible BEARINGS

CONTROL AND ELIMINATE VIBRATION • SHOCK • NOISE

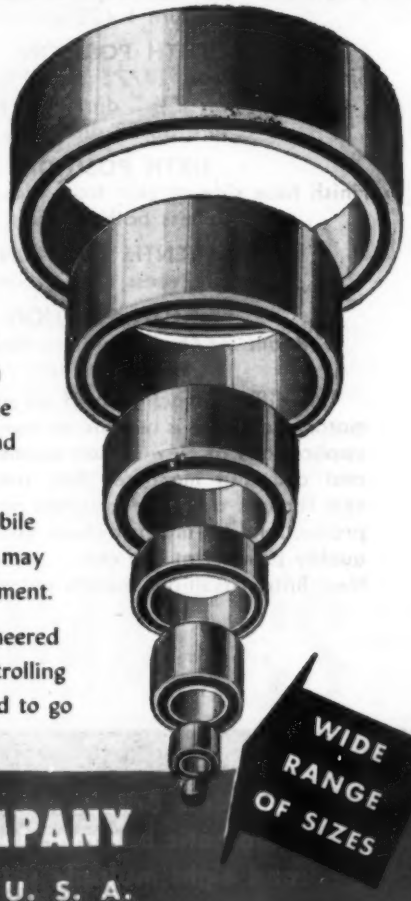
Vibration is a serious menace to moving parts on all types of equipment particularly when coupled with destructive shocks.

Harris Products Company pioneered in the field of engineered vibration-control, created and developed the remarkable *Torflex* Flexible Bearing which controls and eliminates up to 90 per cent of the vibration, noise and shock, compensates for parallel and angular shaft misalignment and requires no lubrication. This increases tremendously the operating efficiency and performance of equipment and adds greatly to its longevity.

Torflex Flexible Bearings consist of a tube or ring of rubber stretched longitudinally between two concentric metal sleeves which prevent the rubber from returning to its original state. The pressure thus exerted by the rubber on the metal sleeves insures a high capacity mechanical bond between the rubber and metal under all operating conditions.

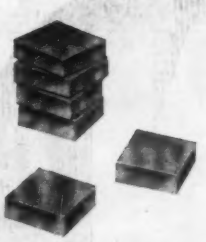
Torflex Flexible Bearings have done an outstanding job on Army and Navy mobile units and are also used extensively on many types of industrial equipment. They may be had in a wide range of sizes and are adapted for use on all types of equipment.

Harris Products Co. has long been a preeminent name in the field of engineered vibration control and today is an outstanding manufacturer of devices for controlling vibration. Our engineers, backed up with many years of experience, will be glad to go to work on your problem, if you will just drop us a line.



HARRIS PRODUCTS COMPANY

CLEVELAND 4, OHIO, U. S. A.

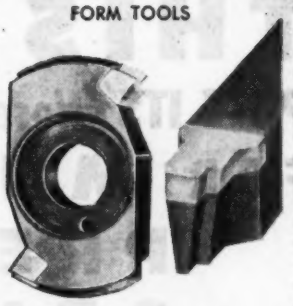


MASTER GAGE BLOCKS

SEAMING ROLL

TIPS FOR SAW TEETH

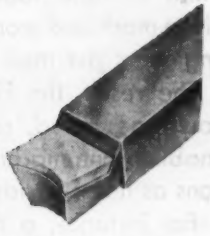
FORM TOOLS



FLASH TOOL FOR WELDED TUBING

TIPS FOR MEAT CUTTERS

ROUTER BIT



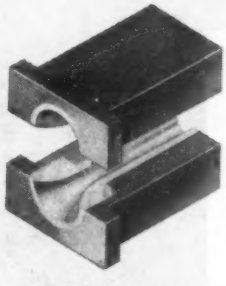
Improve PRODUCTION PROCESSES *and cut costs with* KENNAMETAL SPECIAL TOOLS

TRIANGULAR SAW FILES

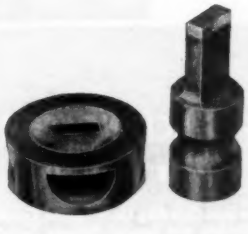
COUNTER SINKS

DIE FILE

BALLS FOR SIZING, ETC.



WIRE ROPE DIE



PRESSING DIE AND RAM

FLARING TOOLS

CHUCK JAWS

The properties that make Kennametal outstanding for fast, economical machining of steel, cast iron, non-ferrous metals, and non-metallics, are equally useful when applied to a variety of other production processes. Shown on this page are a few examples that suggest scores of economic applications of Kennametal on special tools, dies, and rolls.

Kennametal is the tough, strong, cemented carbide that contains an extremely hard intermetallic compound, $WTiC_2$. Its superior wear-resistance comes from a combination of precisely maintained properties—high modulus of elasticity (2 to 3 times that of steel); low coefficient of friction; and exceptional hardness (up to 92.3 on Rockwell A scale).

Kennametal can be accurately molded into almost any shape, limited only by reasonable proportions. Its cost is moderate—almost insignificant when compared with the tool and production economies effected through its use. The best way to prove this is to let us cooperate with you in designing a Kennametal tool for test purposes on your specific job.

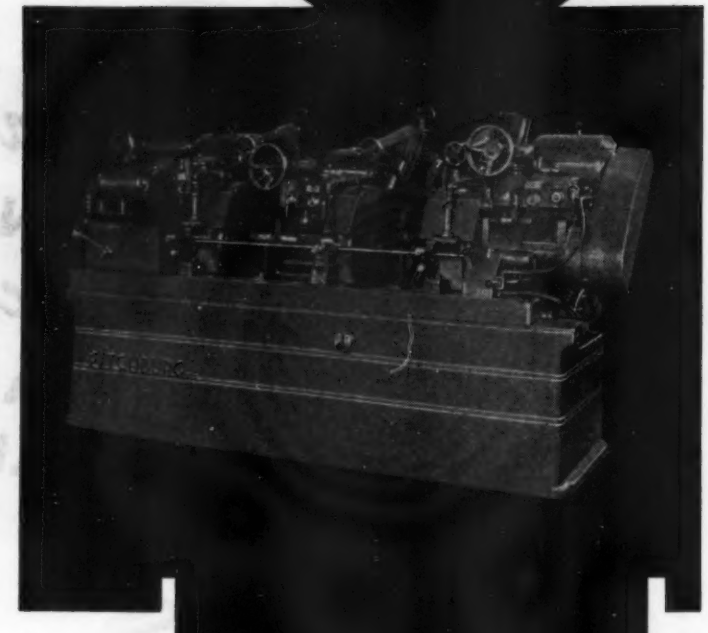
Remember, Kennametal can be used in your production machines without entering into any complicated, continuing agreements.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL Inc., LATROBE, PA.

THIS HEAD
PUTS ITS *"Nose to the Grindstone"*
FOR MULTIPLE PRECISION GRINDING



To bring precision grinding the advantages which multiple tooling and combined cuts have given machined work in mass production, Fitchburg engineers put their heads together.

The result, the Fitchburg independent standard Bowgage Head, completely self-contained, and enabling one machine to perform as many operations as it has heads with which to grind.

For instance, a machine can be arranged for plunge-cut grinding one end and the second head set up for hydraulic traversing for longitudinal grinding, while the number three head is also plunge-cut grinding the other end. This is advantageous on gun barrels or long spindle type pieces where three operations are necessary — and all three operations will be performed within the time of the longest single operation!

If you have an "axe to grind" with your current production speeds and costs, let Fitchburg engineers show you how the Fitchburg method can be applied to your special problem. No obligation. Write today !

FITCHBURG GRINDING MACHINE CORP.
FITCHBURG, MASSACHUSETTS, U.S.A.
Manufacturers of — Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders.

THE HEAD. *The Bowgage Head* is a completely independent precision grinding unit. It has rapid traverse, slow grinding feed, grinding dwell or spark out, and rapid return to starting position — all started by one push button. It is precise to .0002", minimizing spoilage. It can be removed and remounted for other work, if operations are changed.

THE BODY. *The Fitchburg Triple-Head Machine* illustrated is typical of the functional engineering and rugged construction of many special machines into which independent Fitchburg Bowgage Heads can be built to cut costs through multiple automatic precision grinding on mass production. It grinds three dimensions at the same time, within time of longest single grinding operation, and in one handling — with consequent saving in time and reduced danger of spoilage. By grinding several dimensions automatically on the same piece, at one mounting, it releases operator for other work.

Write Today for Catalog—Sent Free Upon Request

A few simple rules to conserve carbide tools

FIRTHITE FIELD SERVICE POSTERS are available for display in your plant

The conservation of carbide tools through proper handling and correct usage is essential not only in war time but at any time for best production results and low operating costs.

These Firthite field service posters will help remind your plant operators in simple, easy-to-take, understandable manner, of the right way to make carbide tools do their utmost.

Fill in and mail the coupon for your set of these free, 17" x 22", four-color posters.

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Please send us without obligation on our part_____sets of Firthite Field Service Posters which we wish to display in our plant shops.

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SCHERR

ADJUSTABLE LIMIT SNAP GAGES

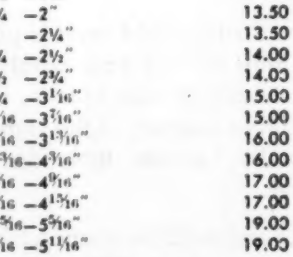
All sizes to 11⅝" now available from stock

They're speeding inspection in hundreds of plants, dependably, with quickly trained help. Close and accurate inspection, even at close limits is a rapid routine matter with Atlantic Snap Gages.

Made in full accordance with American Gage Design standards. Frames of Meehanite for non-warping rigidity. Gaging pins and anvils of hardened steel, lapped to most rigid standards for flatness and parallelism. Model A has round pins—Model C has solid anvil, often used to gage to a shoulder.

Shipped unset and unsealed, or set to your specifications and sealed. Now ready for quick shipment in all sizes to 11⅝". Order today.

GAGE BLOCKS Set your gages with the Scherr Ultra-Chex gage block set, giving 80,000 combinations in steps of 1/10,000. Price $125.00.



THE SCHERR TOOL STAND holds snap gage in place, leaving both hands of inspection free to speed up the job. Where gage is used continuously, avoids transmission of bodily heat to the gage. Price, $7.50.

MODEL A

RANGE (in inches)	PRICE
0 – ½"	$ 9.50
½–1"	10.00
1 –1½"	10.50
1½–2"	11.00
2 –2½"	11.50
2½–3"	12.00
3 –3¼"	13.00
3¼–4½"	14.00
4½–5¼"	15.00
5¼"–6"	16.00

MODEL C

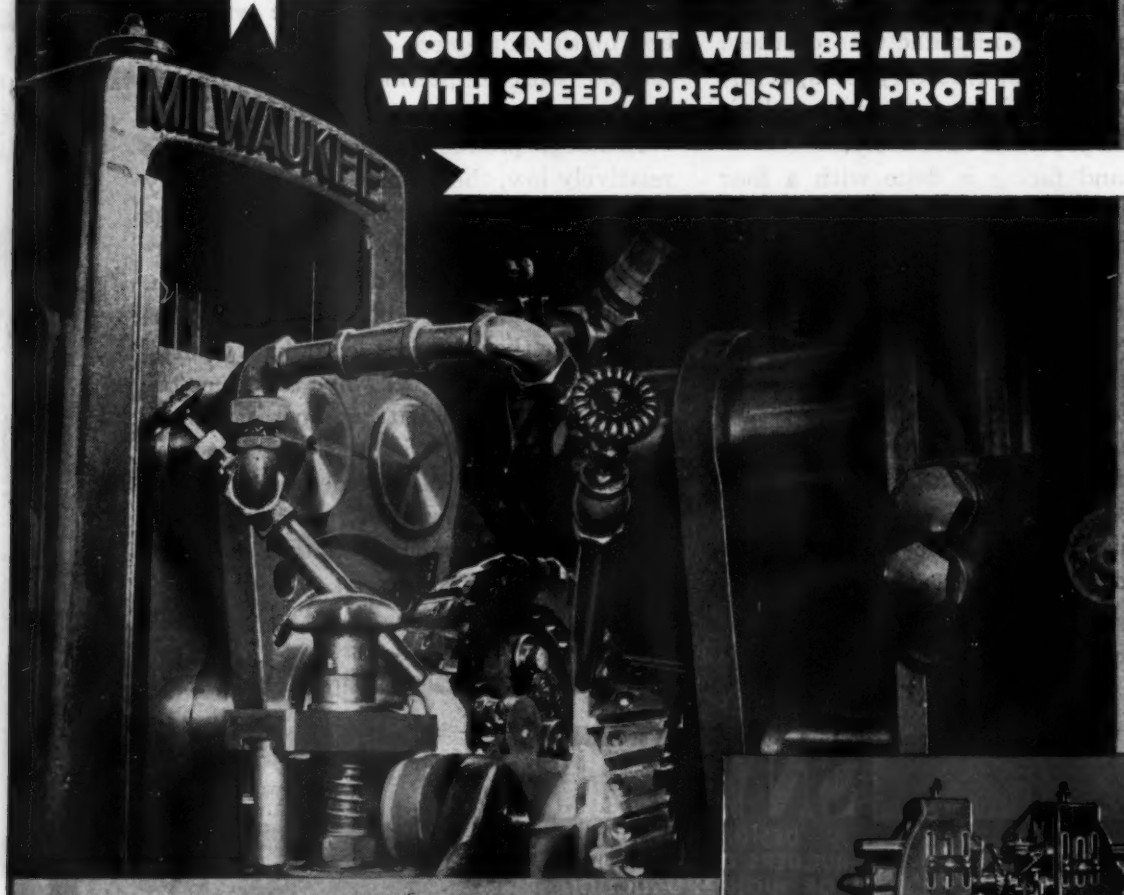
RANGE (in inches)	PRICE
0 – ¼"	$10.80
¼ – ½"	11.50
½ – ¾"	11.50
¾ –1"	12.00
1 –1¼"	12.00
1¼ –1½"	12.50
1½ –1¾"	12.50
1¾ –2"	13.50
2 –2¼"	13.50
2¼ –2½"	14.00
2½ –2¾"	14.00
2¾ –3 1/16"	15.00
3 1/16 –3 3/16"	15.00
3 3/16 –3 13/16"	16.00
3 13/16–4 3/16"	16.00
4 3/16 –4 9/16"	17.00
4 9/16 –4 15/16"	17.00
4 15/16–5 5/16"	19.00
5 5/16 –5 11/16"	19.00

Complete Price List and Discount Schedule on Request

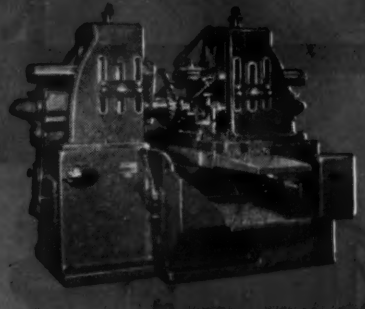
GEO. SCHERR CO., Inc. 201 LAFAYETTE STREET NEW YORK 12, N. Y.

"WHEN YOU PUT IT ON A *Milwaukee*"

YOU KNOW IT WILL BE MILLED WITH SPEED, PRECISION, PROFIT



The straddle milling operation on this 1236 Milwaukee Duplex Milling Machine requires flexibility in spindle positioning because the milling cuts are at different levels.... Independent spindle speeds are necessary because the job required the use of two diameters of cutters. . . . "Anchoring" the spindle quill with the quill support mounted on the overarms, insures vibration-free operation in either "out" or "in" position.



1800 Series Milwaukee Duplex Milling Machine

ARMY (E) NAVY

KEARNEY & TRECKER CORPORATION

MILWAUKEE 14, WISCONSIN

KNOWN as "production type" machines the Milwaukee Duplex series of milling machines offer important advantages:

– automatic trip table mechanism provides for continuous cycles of table movement.

– adjustable nut for *climb milling* eliminates backlash in the table feed screw. This feature permits machining workpiece ordinarily difficult to hold for milling operations — results in increased feeds, improved finishes — anchored quill construction securely supports the quill behind the spindle nose in all positions.

These features plus the compact rigidity and sturdiness designed and built into the machine assure fast, precision production at less cost. Write for new Bulletin No. B20, giving complete details on the Milwaukee Duplex and Simplex Series of Milling Machines.

Milwaukee Machine Tools

Snyder Special for BORING, FACING *and* TAPPING
Heavy-Duty Valves for Oil Fields

Machining valves to handle the oil that keeps our war machine running was slow and costly by conventional methods and called for skilled help which was hard to get. For one particular manufacturer of these heavy-duty valves, this Snyder special-purpose boring, facing and tapping machine solved these problems effectively.

Boring and facing is done with a four speed, single spindle head which is driven and advanced into the work by a Snyder self-contained hydraulic guide bar unit.

To the left of the operator and in front of one of the two boring units is installed a lead screw tapping device which has also a variable tool spindle speed. The entire tapping unit is mounted on a guide bar slide for hydraulic rapid advance.

Spindles are equipped with a breech lock and special tapered holes to make the exchange of tools quick and easy.

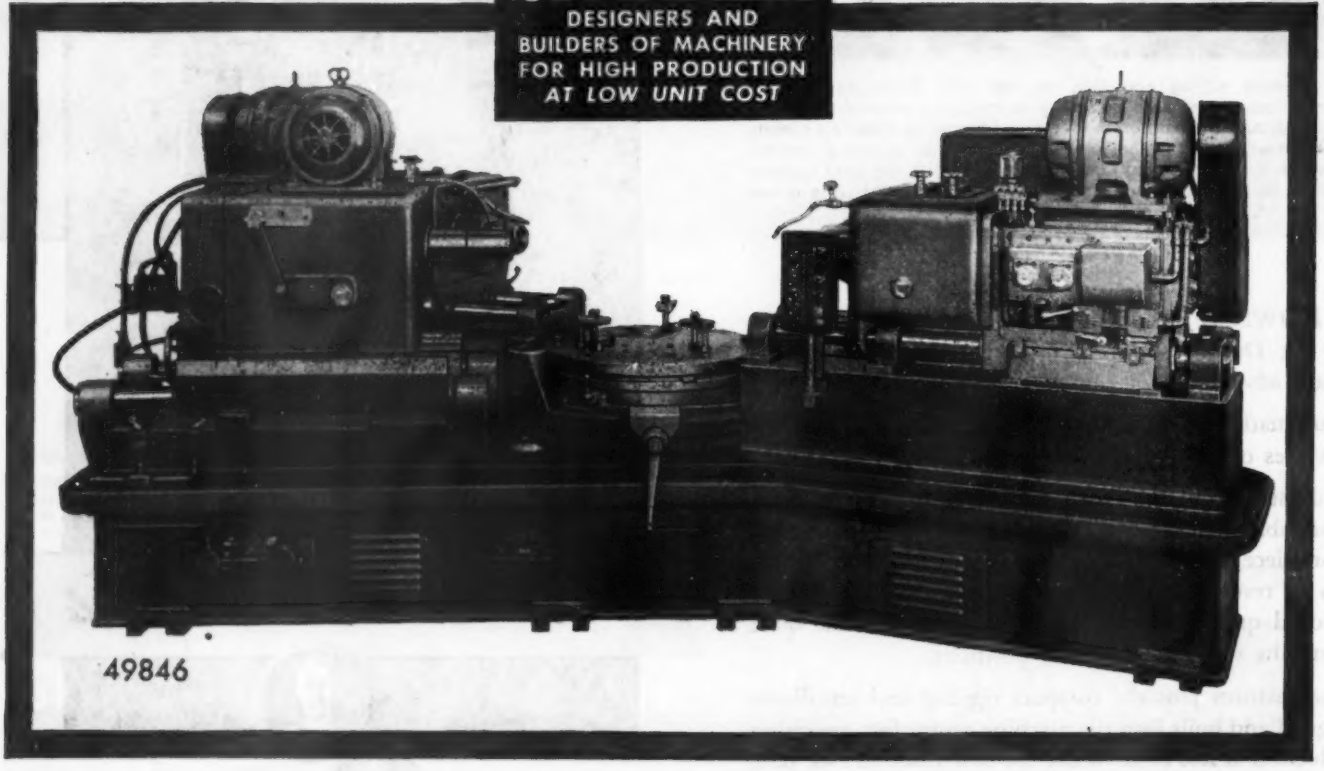
The index table is mounted on a manually operated elevating mechanism which compensates for the various sizes of work and also brings the tools concentric with the boss on the work-piece. This table is indexed for 180° with an intermediate index for the tapping operation.

Although production in terms of units is relatively low, the savings accomplished by such machines are substantial. These savings affect time, handling, operator fatigue, operating skill, quality and uniformity of finish. Similar savings can be accomplished in the machining of other types of large, heavy parts.

If you are looking for ways to reduce the cost of any metal cutting operation it is likely that our experience as specialists in that field can be of considerable value to you. We invite your inquiries. *Snyder Tool & Engineering Company, 3400 E. Lafayette Avenue, Detroit 7, Michigan.*

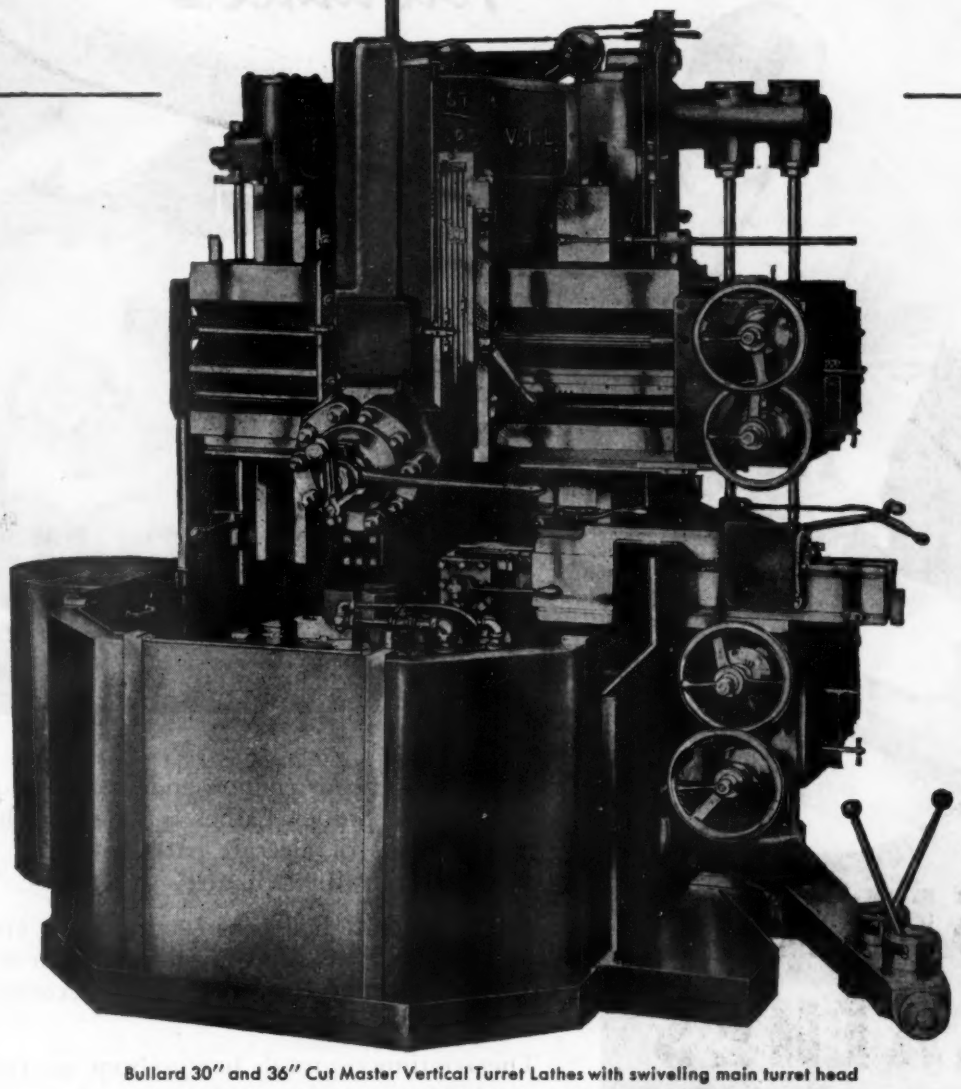
20 Years of Successful Co-operation with Leading American Industries

SNYDER
DESIGNERS AND BUILDERS OF MACHINERY FOR HIGH PRODUCTION AT LOW UNIT COST



MAKES EVERY MINUTE COUNT

. . . *in cost reduction*



Bullard 30" and 36" Cut Master Vertical Turret Lathes with swiveling main turret head and non-swiveling side head. 16 feeds for each head in geometrical progression from .0026 to .500 per work spindle revolution. 20 table speeds. Larger machines in 42", 54", 64" and 74" sizes, with choice of six different head combinations.

Lower machining cost is a natural for every minute of operation of Bullard Cut Master Vertical Turret Lathes. That is because Bullard Cut Masters are designed and built to cut time *on* cuts and *between* cuts.

Screw feeds of main heads assure a high degree of machining accuracy.

Heavy, rigid construction plus H.P. rating and range of feeds and speeds adequate for the fastest cutting tools assure rapid machining with maintained accuracy under the heaviest cutting.

Heavy simultaneous cutting with both heads, easy chucking, conveniently located controls and quick-reading micrometer dials add to the productive ability of every operator.

Cut Master's metal-removing ability shortens machining time.

For complete description of the cost-cutting features of Bullard Cut Master Vertical Turret Lathes, write today, specifying the size that interests you. The Bullard Company, Bridgeport 2, Connecticut.

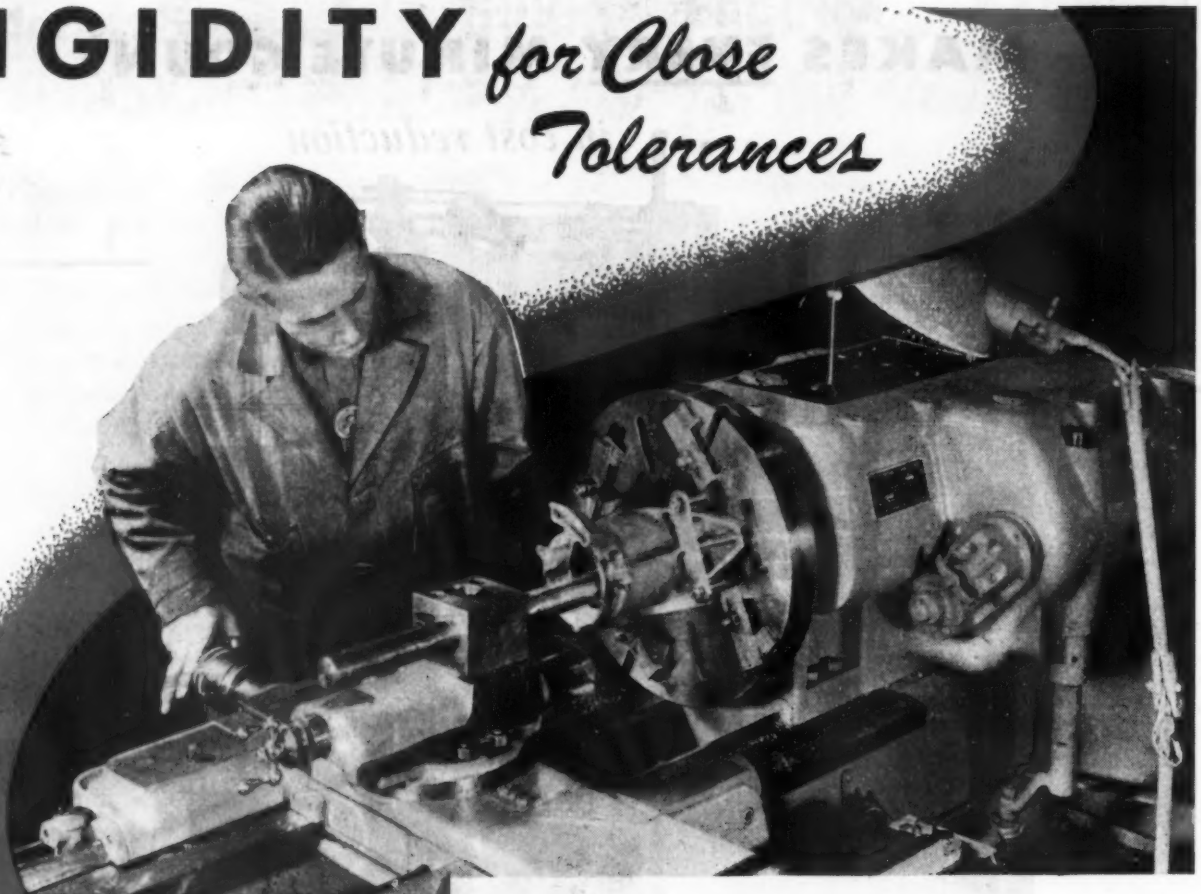
From Government Machine Tool Surplus Lists, select the better machines to replace obsolete models you've been using on non-critical operations. Ask Bullard for information on these models by machine number.

BULLARD

CREATES *NEW METHODS*

TO MAKE MACHINES DO MORE

RIGIDITY *for Close Tolerances*



SIDNEY LATHES

End view showing complete gear train which rotates on anti-friction bearings. The pulley mounted on pre-loaded anti-friction bearings is full floating on a sleeve bolted to the headstock to eliminate deflections of the drive shaft created by the belt pull.

● The rigid construction and smooth flow of power provided in Sidney Lathes is meeting the exacting requirements of aircraft parts in many prominent airplane and allied plants.

The four wall bed construction with cross girts at 12 inch intervals not only differs from conventional construction but assures sustained accuracy and resistance to deflection.

The continuous tooth herringbone geared head, the result of years of experience with this type head, provides a smooth flow of power to the spindle with no thrust loads.

If your work requires close tolerances and sustained accuracy investigate Sidney Lathes.

Bulletins for all sizes available.

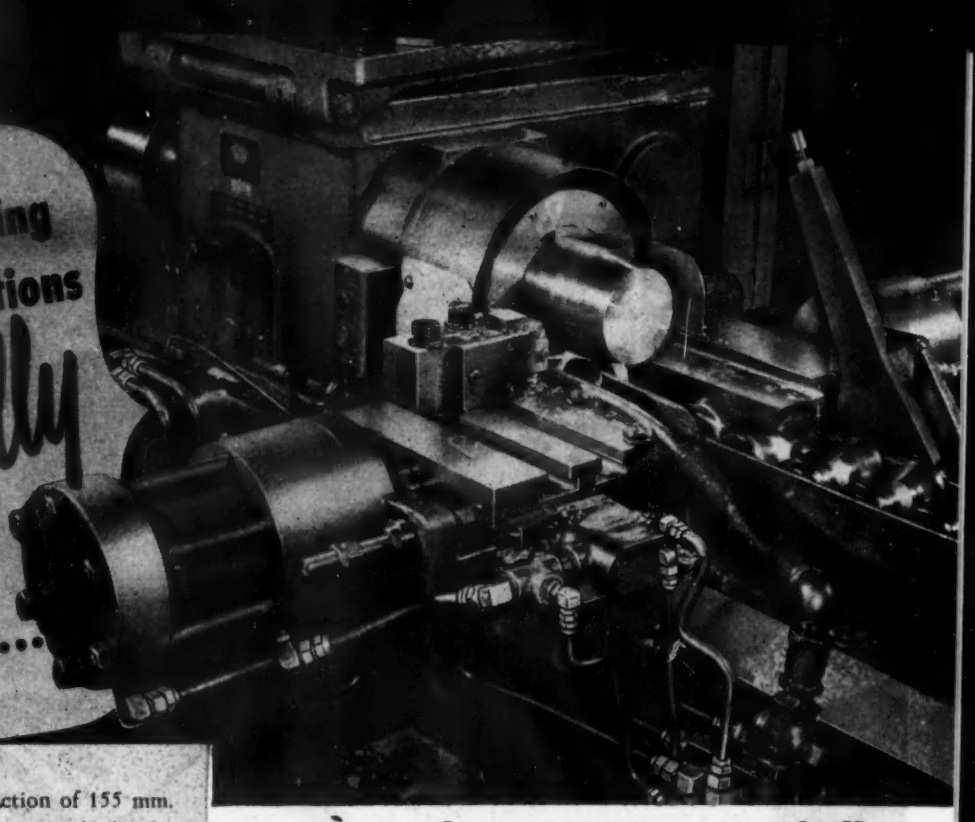
The SIDNEY MACHINE TOOL COMPANY

Builders of Precision Machinery

SIDNEY . OHIO

ESTABLISHED 1904

oading, Chucking, Gaging and Tool Feeding Operations Performed hydraulically IN 1.2 MINUTES...



• Production of 155 mm. projectiles is greatly speeded by Logan hydraulic equipment on Sparks semi-automatic lathes. In this operation, a wide groove for insertion of the rotating band is turned near base of the shell. Chucking and gaging time is only 7.2 seconds . . . overall time including machining and unloading averages 1.2 minutes.

HOW THE HYDRAULIC SYSTEM OPERATES...

Shells move down the roller conveyor to a point in front of the lathe headstock. Here a Logan hydraulic cylinder at the rear of the machine operates an elevating mechanism which raises the heavy projectile for insertion into the collet-type chuck, eliminating operator fatigue. At the same time, this cylinder lowers a stop gage into position, thus assuring precision longitudinal location of the shell in the chuck.

The chuck is operated by a Logan rotating type hydraulic cylinder mounted on the lathe spindle. Another Logan hydraulic cylinder on the lathe carriage activates the tool slide, feeding the cutting tool directly into the work. Logan steel *Collet Grip* Tube Fittings are used throughout to provide leak-proof, vibration-proof connections.

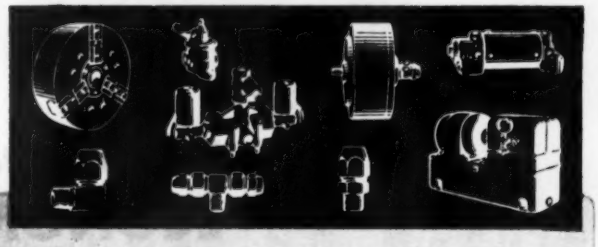
LOGAN CYLINDERS AND POWER OPERATED CHUCKS INCREASE PRODUCTION WITH ACCURACY AND ECONOMY...

Your hydraulic chucking applications and power movements of all kinds can be handled faster, more accurately and more economically with standard Logan hydraulic equipment . . . available in a range of types and sizes to make up complete hydraulic systems. Logan engineers will assist you in your design and manufacturing problems. No obligation.

Write for FREE Literature

Ask for literature on Logan power operated chucks; hydraulic cylinders, valves and power units; and *Collet Grip* tube fittings.

. . . on heavy 155 mm. Shells by complete "LOGAN" HYDRAULIC INSTALLATION



***Standard LOGAN Equipment . . . for* COMPLETE HYDRAULIC SYSTEMS**

Logan Hydraulic Operated Chucks—Available in 2 and 3 jaw universal and combination types, 4 jaw duplex type, two-in-one dual purpose type, compensating finger type, collet type, etc.

Logan Rotating Hydraulic Cylinders—For mounting on rotating machine tool spindles.

***Rotocast* Stationary Hydraulic Cylinders**—Watch for announcement of complete new line with exclusive features and Logan engineering developments.

Logan Hydraulic Valves—A complete range of types and sizes for hand, foot, electric solenoid, cam, pilot and latch operated control.

Logan Hydraulic Power Units—Self-contained units ready for connection to your hydraulic circuit.

***Collet Grip* Tube Fittings**—Steel fittings for permanent, leak-proof, vibration-proof tube connections. Grip tube without digging . . . no threading, soldering or welding.

ARMY E NAVY

Logan

SAVES ★ TIME ★ EFFORT ★ MOTION

Air and Hydraulic Equipment

LOGANSPORT MACHINE CO., INC.

918 CENTER AVE. LOGANSPORT INDIANA

CYLINDERS · VALVES · PRESSES · FLUID FLOW · COOLANT · PUMPS

because they can be depended on for ECONOMY, EFFICIENCY *and* SPEED

All the essential performance qualities demanded in small tools today are met in UNION TOOLS.

Faster cutting, longer life between grinds, accuracy and all-round better performance of these tools are matters of common recognition in plants busy on war work where small tools are subjected to the most exacting service conditions.

You, too, can depend on UNION TOOLS for your requirements. Try them once and you'll use them regularly.

THE UNION LINE

Twist Drills — Milling Cutters — Reamers — Hobs — Slitting Saws — End Mills — Taps — Dies — Screw Plates — Profile Cutters.

●

UNION TWIST DRILL COMPANY, ATHOL, MASS.

STORES—New York: 61 Reade St., Chicago: 11 So. Clinton St., Detroit: 5527 Woodward Ave., San Francisco: 121 Second St., Los Angeles: 524 E. Fourth St., Seattle: 568 First Ave., South.

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UNION

A Barber - Colman Type "D" Hobbing Machine on a typical war-product job — coarse tooth, tough steel pinions — where its accuracy, ruggedness, and high production capacity led to highly satisfactory results.

The pinion that is being hobbed in the picture above. Material SAE 4620 — soft and tough. Dimensions 4.237" O.D., 3⅛" face, 12 teeth 3.544 D.P., helix angle 21°32". Double - thread hob used, running at 63 r.p.m. with a feed of approximately .600" per minute. Production is 7 pieces per hour and hob gives 70 pieces per sharpening with 2 settings.

BARBER-COLMAN

TYPE "D" HOBBING MACHINE

HYDRAULIC drives on this extra rugged hobbing machine give high production, accuracy, and smooth finish on tough gear-cutting jobs, and make handling of the machine quicker and easier for the operator. The machine will handle blanks up to 14" diameter and 14" face. Maximum size of cut will depend on hob size, governed by pitch of teeth or number of splines. Both spur and helical cuts are provided for. HYDRAULIC feed drive through an oil-powered fluid motor instantly adjusts itself to varying power requirements and provides a "cushion" to absorb shocks and reduce tooth marks. HYDRAULIC drive on the vertical positioning of the work spindle slide and overarm, hydraulically-operated clamps actuated by simple control levers, reduce to a minimum the effort required in loading, setting, and operating the machine. The Barber-Colman Type "D" Hobbing Machine has proved its durability and accuracy on many tough war-product jobs where continuous high performance over long periods under the most difficult conditions has been commonly required. *Consider the Type "D" for the tough gear-cutting jobs now facing you — it can satisfy your needs.*

BARBER-COLMAN COMPANY

HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

GENERAL OFFICES AND PLANT • 111 LOOMIS STREET • ROCKFORD, ILLINOIS, U.S.A.

ARMSTRONG

100-150 f.p.m. **200-300 f.p.m.** **300-600 f.p.m.**

Whatever the Cutting Speed . . .

ARMSTRONG TURNING TOOLS
for High Speed Bits

ARMSTRONG CA Tool Holders for
ARMALOY Bits

ARMSTRONG Tool Holders
for ARMIDE Cutters

Whatever cutting speed an operation calls for there is a correct ARMSTRONG TOOL HOLDER that takes the proper bits, blades or cutter to do the operation economically and efficiently.

ARMSTRONG HIGH SPEED

For general tool room and machine shop use, ARMSTRONG HIGH SPEED Bits and Blades are unsurpassed. They will stand up to speeds and feeds far greater than those generally accepted as "standard".

ARMALOY

ARMALOY Bits and their corresponding ARMSTRONG CA TOOL HOLDERS are recommended for machining sand-fitted castings, malleable iron, non-ferrous metals, rubber, plastics and for machining steel on modern high production machines, where sufficient speed and feed can be obtained to take advantage of their greater cutting capacity.

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ARMIDE Carbide-Tipped Cutters and ARMSTRONG Carbide Tool Holders, make the use of Carbide-tipped tools practical in even the smallest shop. Coming in two grades ARMIDE Red (for steel) and ARMIDE Gray (for cast iron, brass, aluminum and non-ferrous materials). They easily machine hard and tough steels, and stand up to the highest speeds and heaviest feeds, and increase the interval between tool re-grindings as much as 10 to 50 times.

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Centerless ground threads, made possible for the first time by the new LANDIS TOOL Centerless Thread Grinder, have all the advantages of a ground finish such as accuracy, smooth surface, bright finish *plus* the special centerless advantages of high production at low cost of a wide variety of threaded parts.

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Costs tumble because of speedier production, fewer rejects, less inspection. If you can use the accuracy and low cost of centerless ground threads, it will pay you to investigate the new LANDIS TOOL Centerless Thread Grinder.

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- Freedom from burrs
- Perfect thread form
- Perfect lead control
- Perfect starting thread
- Smooth surface

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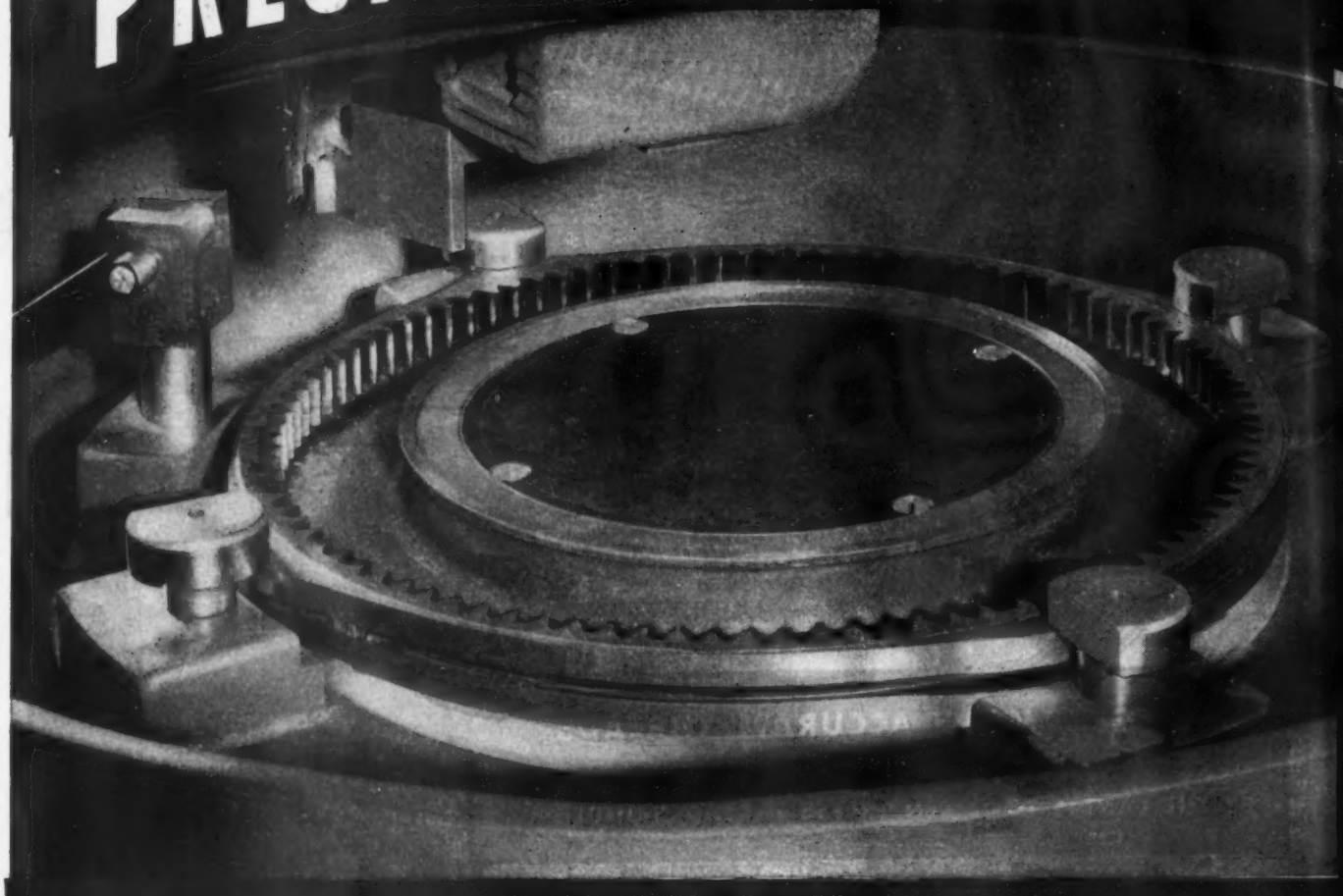

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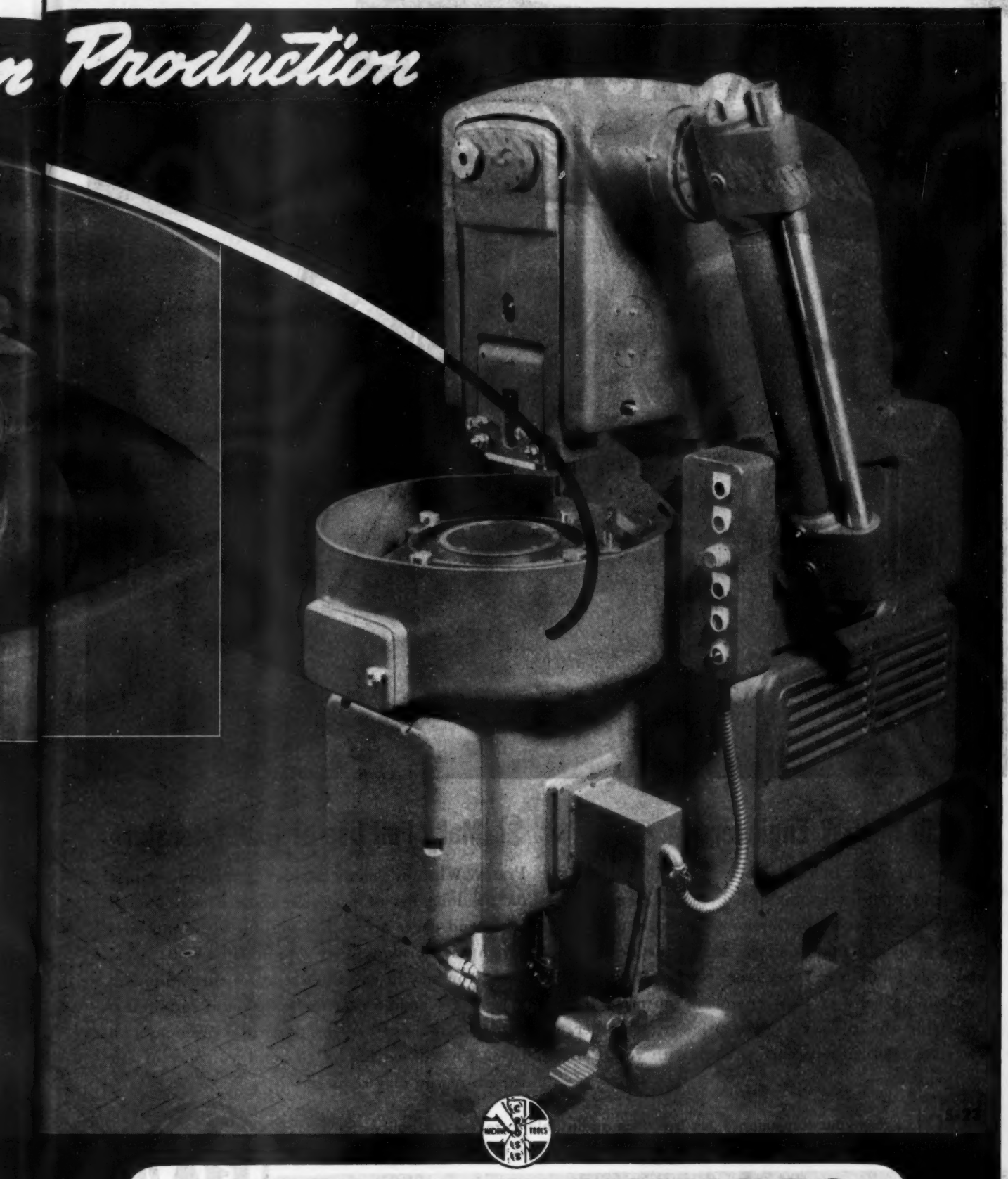

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for automatically performing any one or a combination of metal cutting operations
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TWO WAYS TO RELIEVE *Reconversion Headaches*

1 Call in P&W Engineers

Their long years of experience in solving tooling problems can be of invaluable help to you in smoothing the way as your reconversion plans begin to take concrete form. Although all war needs must be given first consideration in every case, you will find that the helping hand of P&W engineers can make the inevitable change-over easier, quicker, smoother. They are ready at any time to work with you. Call on them — now.

2 Make Full Use of P&W Literature

Pratt & Whitney's many catalogs and other literature on the long list of precision machine tools, small tools, and gages are full of helpful ideas and facts which have broken many a production bottleneck. Here, you may discover new uses for the equipment you have — or find that the addition of certain machines or tools will solve a particular problem with ease. We will be happy to send you any of our literature you may request.

NOTE: For your convenience, we are once again able to renew our policy of maintaining stocks of all standard tools and gages at our branch offices.

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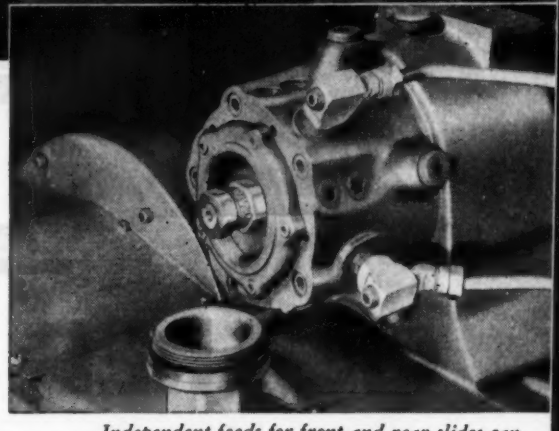

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This modern automatic lathe wastes no time in its swift operating cycle—on both machining and non-machining functions. It provides fast approach to work, fast retract at completion of cuts. And its productivity is further increased by the extreme rigidity that enables you to take multiple cuts smoothly and without vibration.

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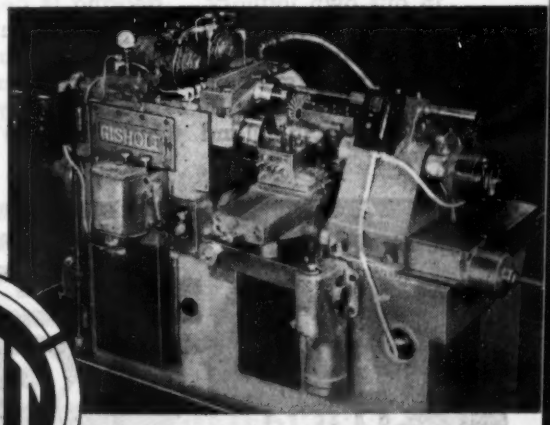

The flexibility of this hydraulic system permits the addition of supplementary slides to bring more tools into play—to eliminate extra operations—to do more in less time.

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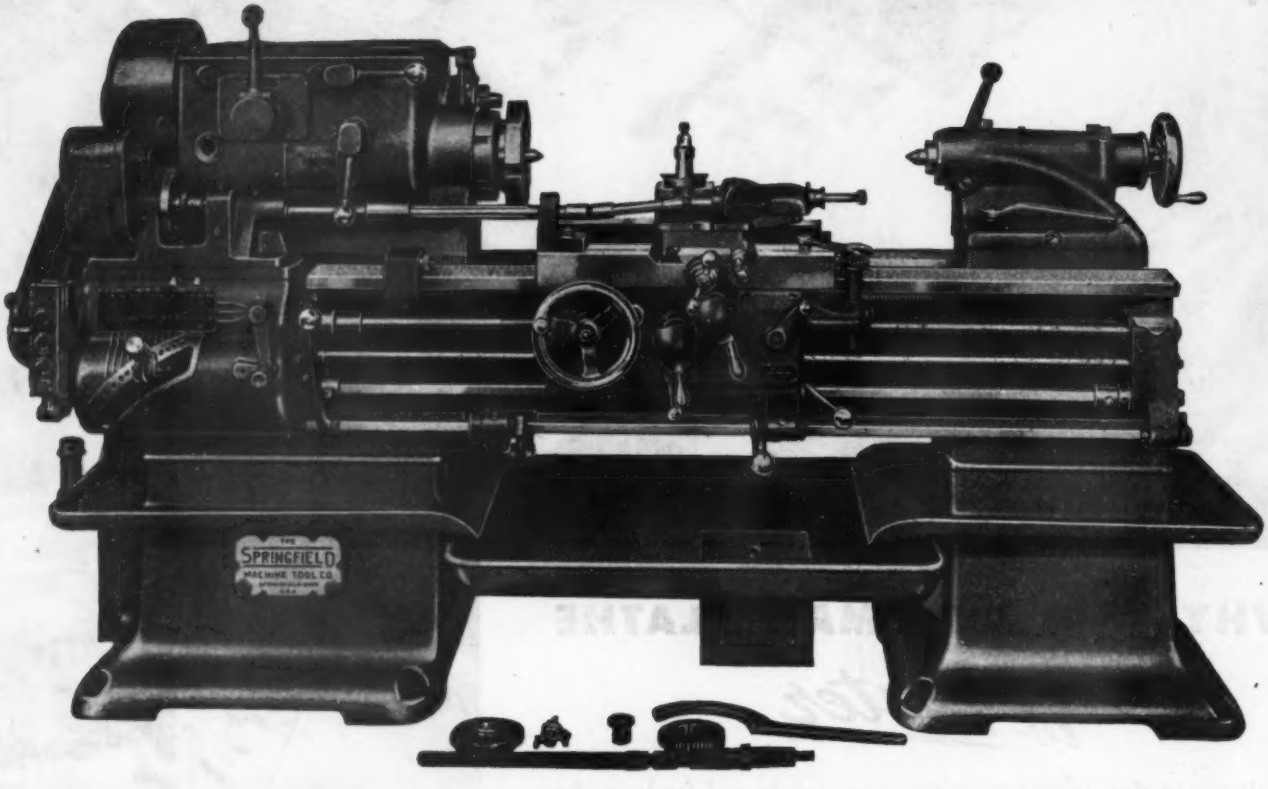

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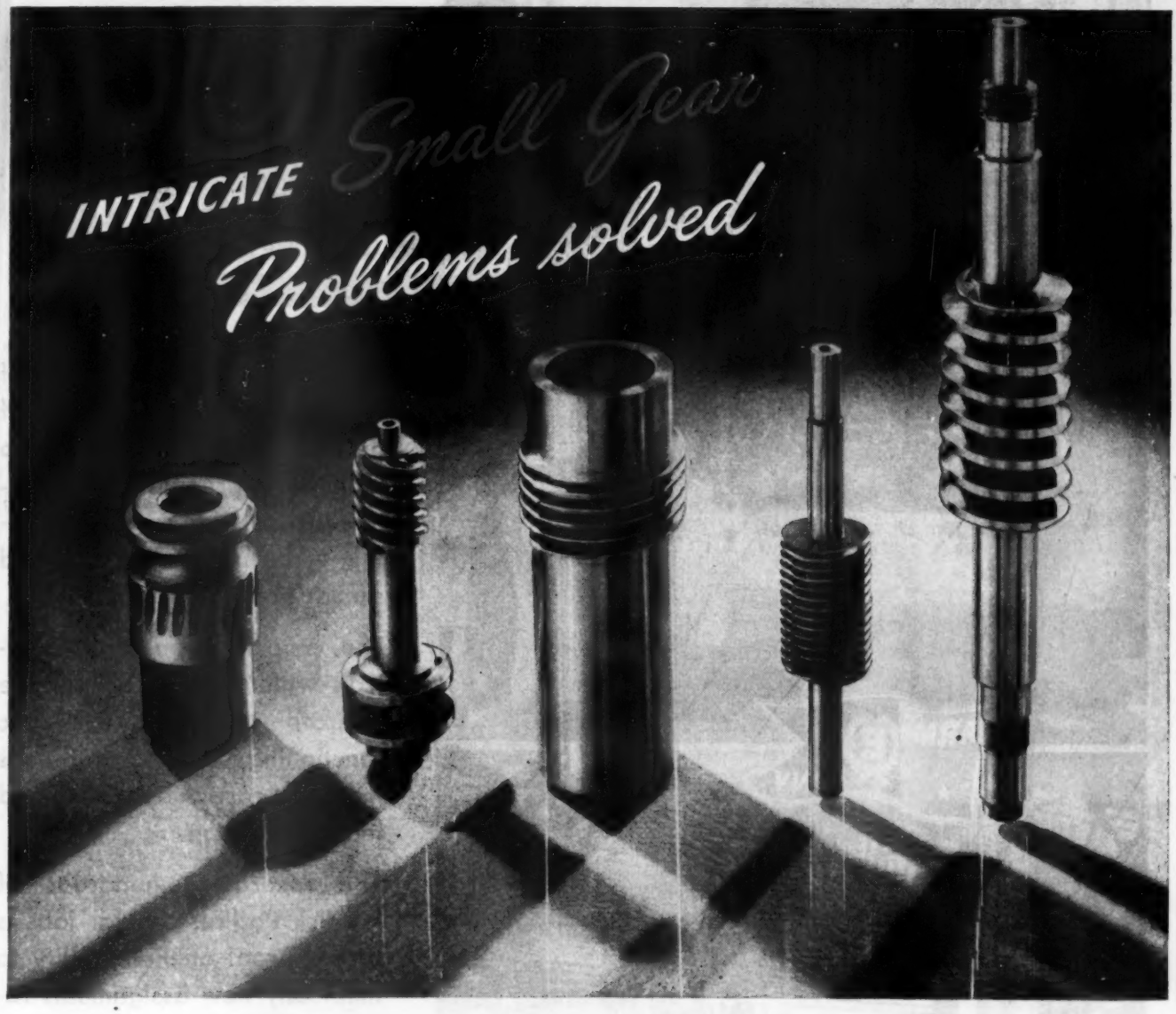

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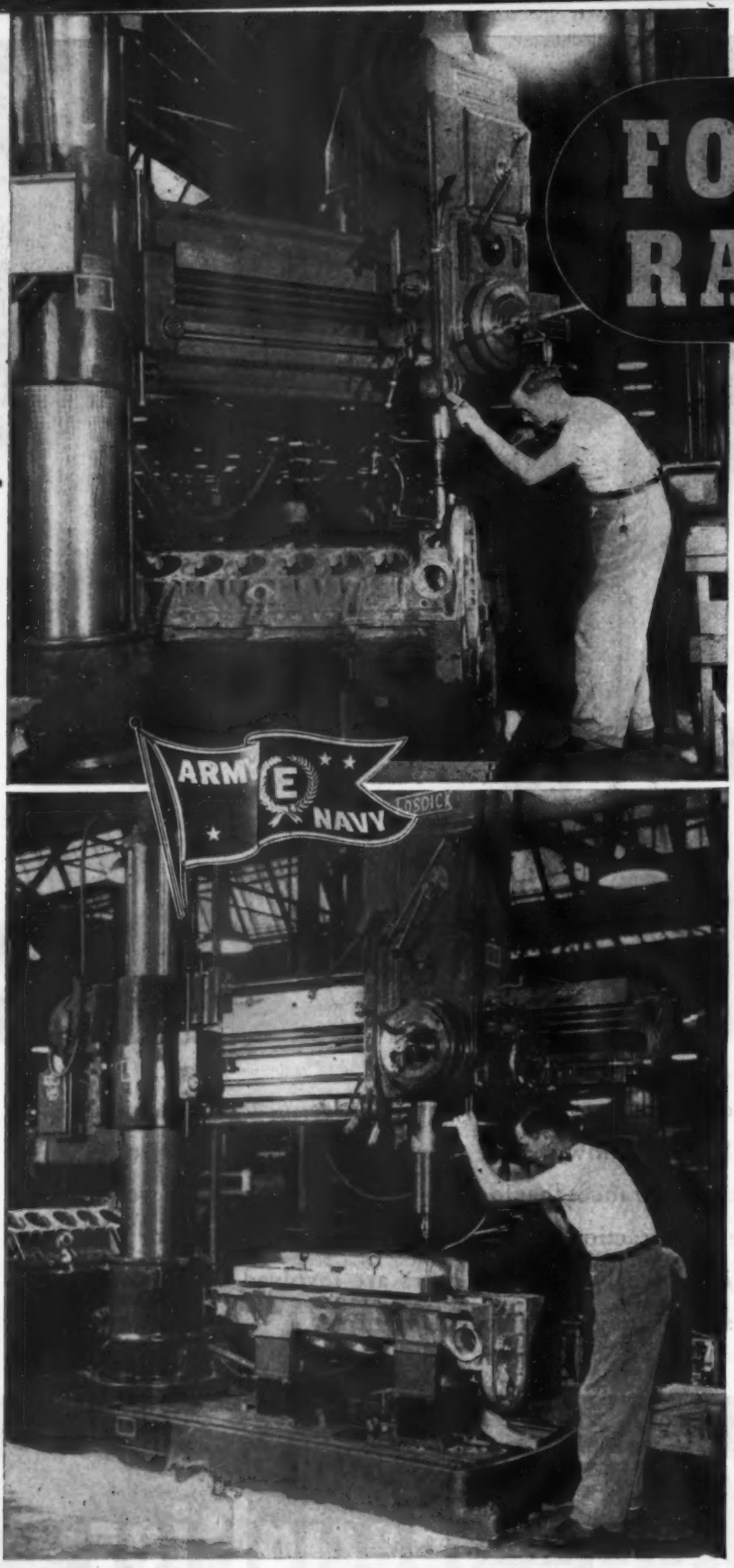

● The rigid construction of base — column — and arm of the Fosdick Radial enables it to maintain precision requirements on a wide range of drilling — boring — tapping and similar operations.

The centralization of all controls within easy reach of the operator and the hydraulic functioning of important units make for ease of operation and high production.

The record of hundreds of Fosdick Radials on war jobs is ample proof of their ability to meet any new assignments required by reconversion.

One of the Fosdick Radials illustrated is performing a boring operation the other is drilling the same piece using a jig for locating holes.

If your work calls for a Radial put it on a Fosdick.

For details on construction and design features write for Fosdick Radial Drill Bulletin R A

FOSDICK MACHINE TOOL COMPANY
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TOUGH STUFF

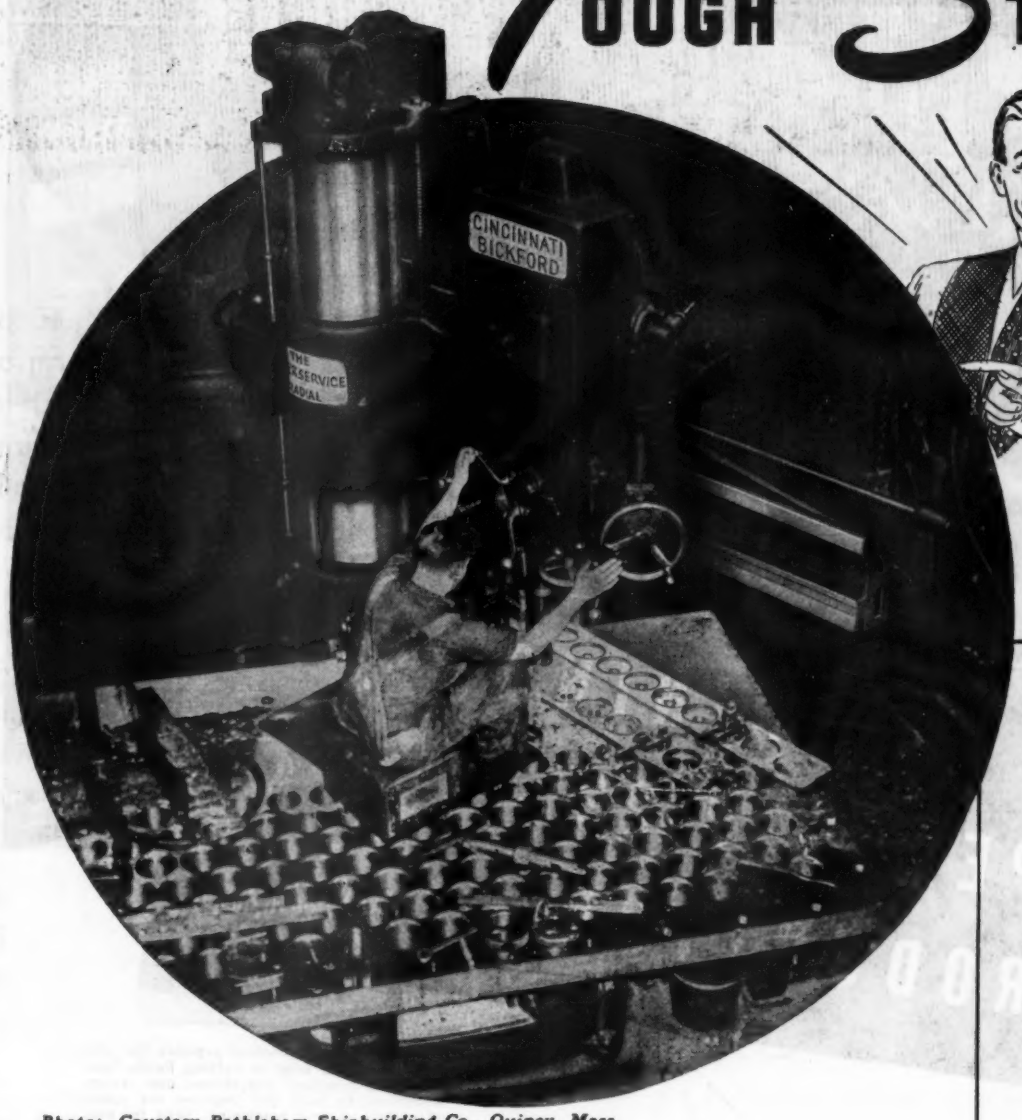
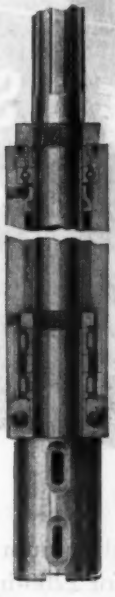


Photo: Courtesy Bethlehem Shipbuilding Co., Quincy, Mass.

Five-inch holes—in armor plate six and one-half inches thick, were completed in one drilling and two fly-cutting operations. From fifty to several hundred holes were produced per piece. The unusual performance of this Cincinnati Bickford Super Service Radial demonstrated its outstanding accuracy, ease of handling, and stamina.

Consult us on your drilling problems.

Write for detailed Bulletin R-24-A.
See our condensed catalog in Sweet's File.



The Cincinnati Bickford chrome nickel spindle sleeve and bearings feed down with the spindle—so no matter what the length of feed, the spindle is rigidly supported. Feed pressure is taken by an unusually large thrust bearing. Roller and ball bearings require lubrication at intervals of three to four months.

Equal Efficiency of Every Unit Makes the Balanced Machine

RADIAL AND UPRIGHT SUPER SERVICE DRILLING MACHINES

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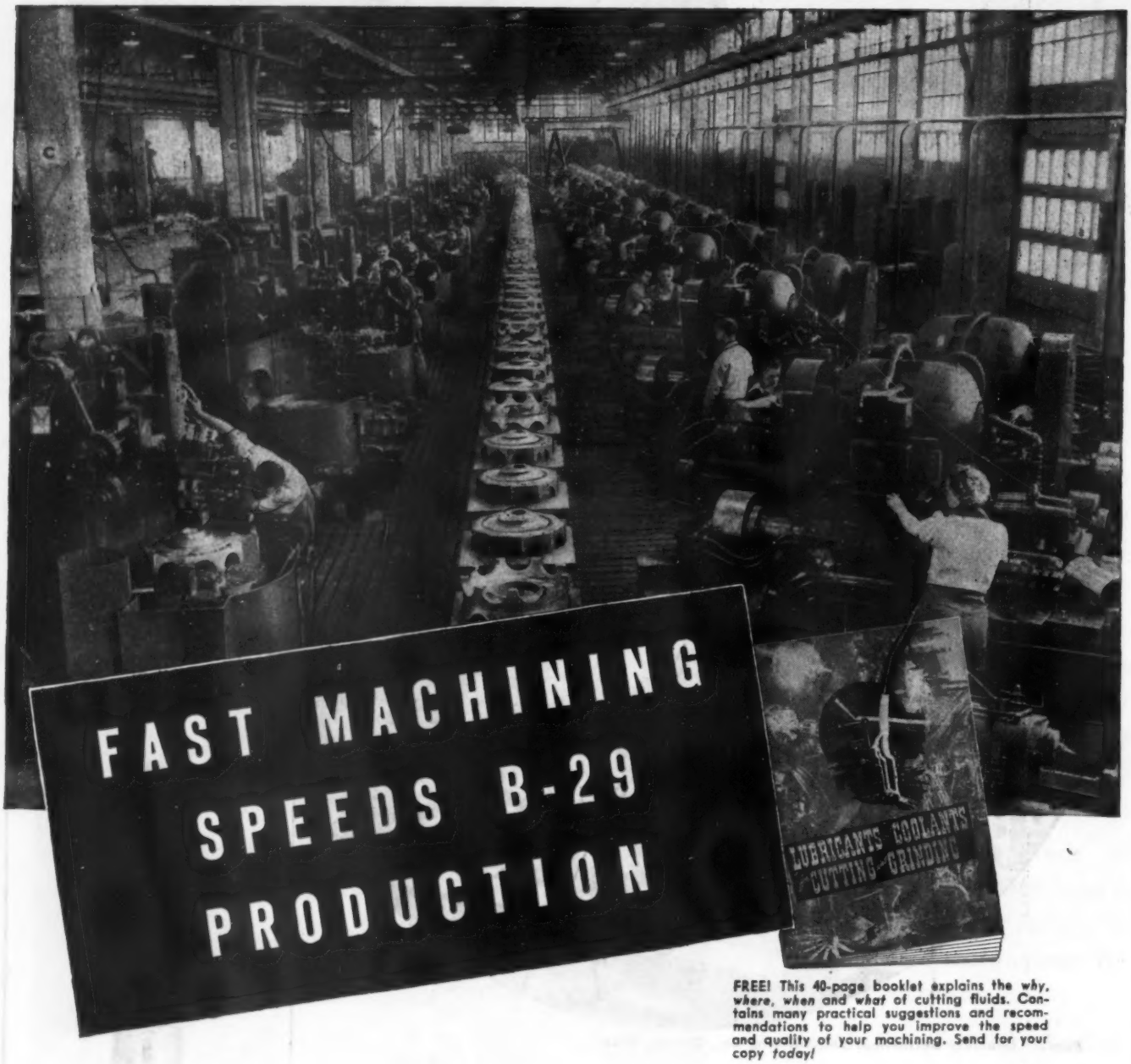

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The Atomic Bomb

THE USE of the atomic bomb has startled the world as no other scientific event in years. The wiping out of an entire city by dropping a small missile upon it is almost beyond human conception. To read about it, let alone have any part in it, is awe-inspiring.

Upon us and the British rests a crushing responsibility, since we possess the only facilities in the world for its production. It must be employed wisely in wartime, its main justification already being the fact that it has shortened the war and thereby saved countless American lives.

Beyond that, the atomic bomb has brought so near the possible destruction of the entire world in another war that all the nation must soberly approach in a new spirit the task of keeping the peace in the future. One shudders to think what terrors will be unleashed if man in the years to come must engage again in armed conflict.

The bright side of this scientific phenomenon is the harnessing of the energy of the atom to serve industry and the world's people in peacetime enterprises. No one yet knows exactly how that will come about or how soon, but we are sure that such use of atomic energy will be made.

It is too early to see clearly how it will affect the metal-working industry, but it is bound in time to have a profound influence through the changes that it will bring about.

If our scientists and researchers had not been working feverishly day and night to perfect the new bomb as well as other weapons, we would not have attained the overwhelming advantage that brought Japan to its knees in surrender.

The job yet to be done by these men of science is to see that the many peacetime benefits to be derived from atomic energy are made available on a practical level.

The general public that expects such results next month or next year will be disappointed. Much development work remains to be accomplished and the present very costly production process must be brought down to a reasonable basis before industry can afford to use this new source of power.

The atomic bomb and the threat of its further use has been one of the chief means of putting the Japanese out of the war so quickly that we, by necessity, are far from prepared for a quick readjustment to a peacetime economy.

Now that the war has terminated, speed is imperative by the government in expediting a reconversion program for American industry.

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Shear to THOUSANDTHS OF AN INCH...

The square blank—the accurate blank—is the profitable blank. The rapid, accurate performance of Cincinnati Shears saves many an hour in the forming and punching operations, and many an hour in the general assembly and fabrication that follow.

Cincinnati Shears pay double dividends in time saved in shearing and in time saved in fabrication.

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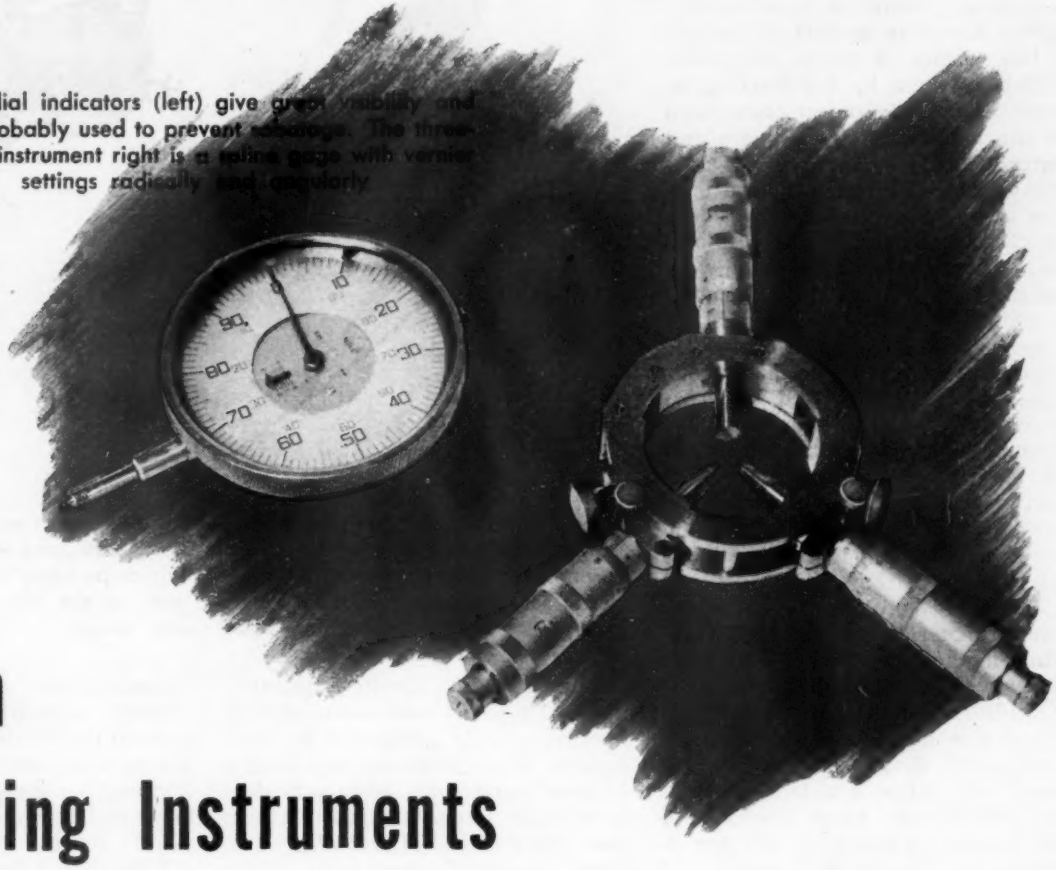


Large dial indicators (left) give great visibility and were probably used to prevent sabotage. The three-legged instrument right is a caliper gage with vernier settings radially and angularly

German Measuring Instruments Reflect High Degree of Precision

Collection of devices in the hands of the Navy Department shows close control of quality in enemy metal-working plants

GERMANY'S metal-working industry lost the race for war production but not because of any inferiority in its instruments for the control of quality. In fact a collection of measuring devices recently brought to Washington by the Bureau of Aeronautics, U. S. Navy, reflects a high degree of precision and some ingenious innovations for the maintenance of close tolerances.

Made by such firms as Zeiss, Mauser, Hommelwerke, Hahn & Kolb, and Horn, German measuring instruments lean heavily on the use of optics and mechnical construction rather than electrical or pneumatic gaging. While air and electric gages were found in a few German shops their application was limited. On the other hand, high quality gage blocks, vernier calipers, microscopes and other precision tools, usually confined to the toolroom in this country, were used in profusion in operating departments. The policy was to put these means of quality control right on the job rather than to depend primarily on the transfer of working tolerances to snap, plug and ring gages. Likewise less reliance was put on the use of specialized jigs and fixtures than is commonly done in the United States.

An advantage of this practice was a flexibility in German tooling that facilitated getting into production on new designs and changing designs when thought advisable. Obviously the employment in the shop of precision instruments required a higher degree of worker skill than the use of single-purpose gages and fixtures. In recognition of this fact, skilled mechanics, toolmakers and tool engineers in the Reich were universally exempt from military service. An indication of German industry's evaluation of good workmanship was the maintenance to the last year of the war of the four-year system of apprenticeship. Even after the manpower shortage became critical and the government asked for a curtailment of the training period, industry grudgingly reduced apprenticeship courses to three years. This may be

contrasted with the vestibule schools and other quick training plans which largely replaced long term apprenticeship in this country.

Free Workers Better

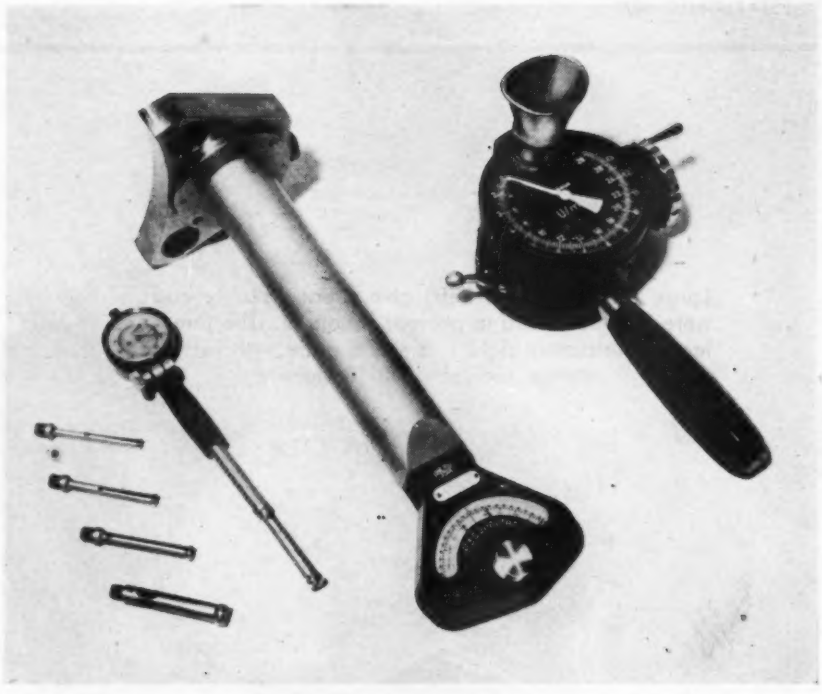
Events have shown that greater volume of production were realized by the American method of employ- a large army of green and semi-skilled workers by transferring as much as possible the craftsmanship of the toolmaker to the gages and fixtures employed in the shop. Germany had a problem in its ten million slave laborers—Russians, Poles, Czechs, Frenchmen, English, Italians and other nationalities—who were the unwilling victims of the Nazi war machine. It was the task of the nucleus of skilled German workmen to maintain quality while taking advantage of this badly treated, underfed reservoir of conscript manpower. The formula dictated the use of skilled Germans as supervisors, toolmakers and inspectors, with the profuse application of high grade measuring devices. No attempt was made to educate slave laborers.

German gage blocks were made of similar materials and by similar lapping methods to those used here. They were checked, however, by a Zeiss Ultra Optometer, an instrument reading to half a micron. This is a mechanical device using a reflected beam of light as a weightless lever to indicate size. Gage blocks were not locked in toolrooms for use as merely as masters but were found throughout German shops.

German toolmakers went in heavily for the use of visual gaging, often using dial indicators to give a quick means of reading absolute measurements. These indicators were of high quality, usually graduated to hundredths of a millimeter and having 15-jewel movements. Shop indicators were made large, hundreds of them about four inches in diameter being found in some German plants. Since this size is larger than that required for individual use it is possible that these dials were used by slave laborers who could be checked from a distance if they attempted sabotage.

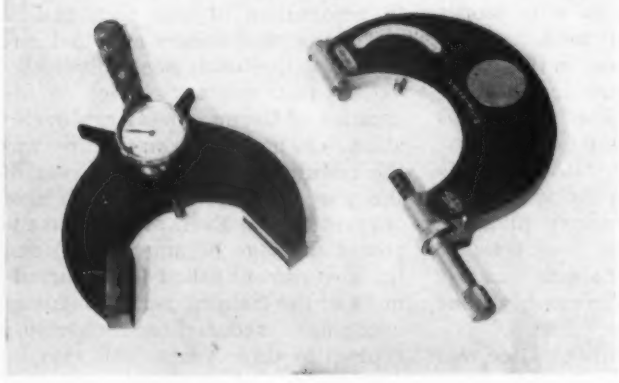
Every cylindrical grinding machine at the Mittle Deutsche Motoren Werke was provided with an inspection gage equipped with one of these large dial indicators. Readings were visible several aisles away making it difficult for the worker to falsify dimensions even if he wished.

Dials were frequently built into the frames of micrometers to obtain an easy reading after initial setting

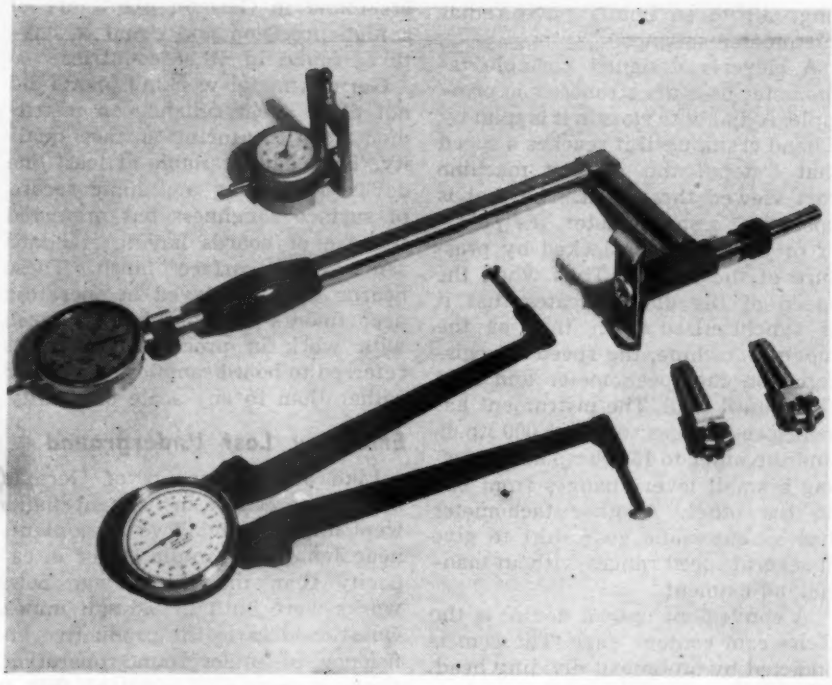


Part of the set of interchangeable buttons are shown with the small bore gage (left). For larger bores, a visible dial is equipped with a set of bases giving three-point contact. At the right is a portable tachometer with a hand-actuated stroboscopic dial. The lever at the left of this instrument changes the speed range

Both of these diameter gages have cemented-carbide contact surfaces. That on the left has micrometer readings plus a dial indicator. The one at the right is an adjustable snap gage with a built-in indicator



Left to right are an external thread gage, an internal thread gage and a bore gage. All have visible readings. The thread gages have interchangeable points and are set to masters (as shown left). The bore gage has split buttons which actuate a pushrod to the dial



Three types of bore gages are used for a variety of work. At the top is one for use with an extension rod. The movable contact is between the sides of the frame. Next below is a dial gage which is used with the indicator at right angles to the bore. The lower gage works like a scissors. Tough wheel dressers at the right are believed to be made of boron carbide

and to eliminate the need for skilled "feel" in using them. The spring in the dial gives uniform pressure for each measurement and avoids the chance of forcing a reading.

Contact surfaces on these "mikes" and other measuring devices were generally made of cemented carbide to reduce wear to a minimum. The frames of the instruments are heavy and are frequently made of nickel-alloy steel to eliminate the effects of temperature change. Some micrometers had wooden pads on the frames to insulate them from the heat of the worker's hands.

One modification of the dial micrometer was in effect a universal gage in which interchangeable anvils provide a variety of sizes. A built-in indicating needle can be set to nominal diameter by means of gage blocks. The frame of this instrument is provided with a third contact point which is adjustable to fix the location of the measuring points at the largest diameter.

Another instrument for measuring depth of keyways has two fixed flat angular surfaces with a movable contact between them to transmit the reading to an indicator.

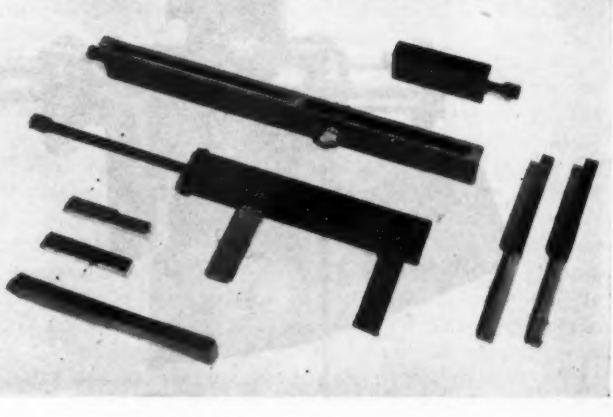
Thread Measurement

German shops apparently laid great stress on thread tolerances, many of their fine instruments being designed for thread measurement. Thread micrometers, both internal and external, have the characteristics of their plain "mikes," usually being provided with visual readings. A variety of interchangeable contact points go with each thread micrometer, and these can be set by means of fixed master gages. An ingenious internal thread micrometer has a contact point and guide surfaces that can be collapsed by means of a thumb lever at its outer end. When inserting the points into an internal thread one side is held in until the desired depth is reached; then the lever is released and the reading taken. This instrument also had spirit levels set in two planes so it could be held accurately in horizontal or vertical positions when in use.

The three-wire system of thread measurement is facilitated by mated pairs of wires mounted in clips. One clip carries a single wire while its mate carires two wires. The clips are held in a bracket that positions them at opposite sides of the thread. Over-all measurement is then taken by a micrometer in the usual manner. The device avoids the inconvenience of handling loose wires.

Three-wire thread measurements can be made more readily with standard wires held in brackets. These are parts of an incomplete set

For layout work, round or knife-edge measuring points can be spaced with accurate gage blocks. Clamps of varying lengths hold them together. Only a small part of the set is shown



Thread profiles are inspected on Zeiss toolroom microscopes which are equipped with ground glass disks on which a wide range of thread contours are scribed. By revolving the disk any desired pitch of thread can be brought to the center of the object lens. The microscopes can be used also to check radii, gear tooth contours and irregular shapes. The table of the microscope in the hands of the Navy is provided with a watch mechanism. By means of this arrangement the table is moved mechanically at a preselected speed so the part under examination can be viewed progressively.

Means of Bore Measurement

Measurement of small bores can be made by a series of spring buttons which are arranged to actuate a dial indicator. When squeezed together the buttons move the conical end of a pushrod longitudinally while it in turn actuates the contact point of the dial. For larger bores the indicator holder carries one of a series of interchangeable steel plates with two fixed guide surfaces and a movable button to form the third point of a triangle. A variation of this device is one which gives bore readings at right angles to the mounting of the indicator.

An interesting universal gage is designed for extrenal splines. This device has one fixed point on the inside of a ring and two other points with angular adjustment. These latter points may be set angularly by means of vernier protractors on the ring; all three points have radial micrometer setttngs.

A cleverly designed portable tachometer uses the stroboscopic principle. A dial with slots in it is spun by a hand crank until it reaches a speed that "'stops" the moving machine part viewed through it. The dial is hooked to a speedometer, the pointer of which can be locked by pressure of the thumb. Thus when the speed of the dial indicates that it is synchronized with that of the moving machine, the speed is registered on the speedometer and held there until read. The instrument has two speed ranges: one to 3,000 r.p.m. and the other to 15,000 r.p.m. Throwing a small lever changes from one to the other. Another tachometer has an automatic gear shift to give it several speed ranges without manual adjustment.

A convenient optical device is the Zeiss cam contour gage. The cam is indexed by an optical dividing head. The contact point of the contour gage is then held against it at constant pressure by means of a counterweight. The linear motion of the point is obtained on a graduated ground glass scale viewed through a microscope. Plotting the angular and linear readings gives the cam contour to a fine degree of precision.

Disk-like grinding wheel dressers, pivotably mounted in holders, are particularly effective in truing abrasive wheels. A preliminary analysis of the material in the disks indicates it is boron carbide.

Electronically controlled jig borers found in German plants are of a high precision and equal to anything found in other countries.

German metal-working plants did not place great reliance on instruments for measuring surface quality. They had available at least one device for giving a graphic record of surface roughness but preferred the use of boards having standard samples of surface finish. These boards were displayed in operating departments for visual comparison with work in process. Blue-prints referred to board samples by number rather than to any scale of quality.

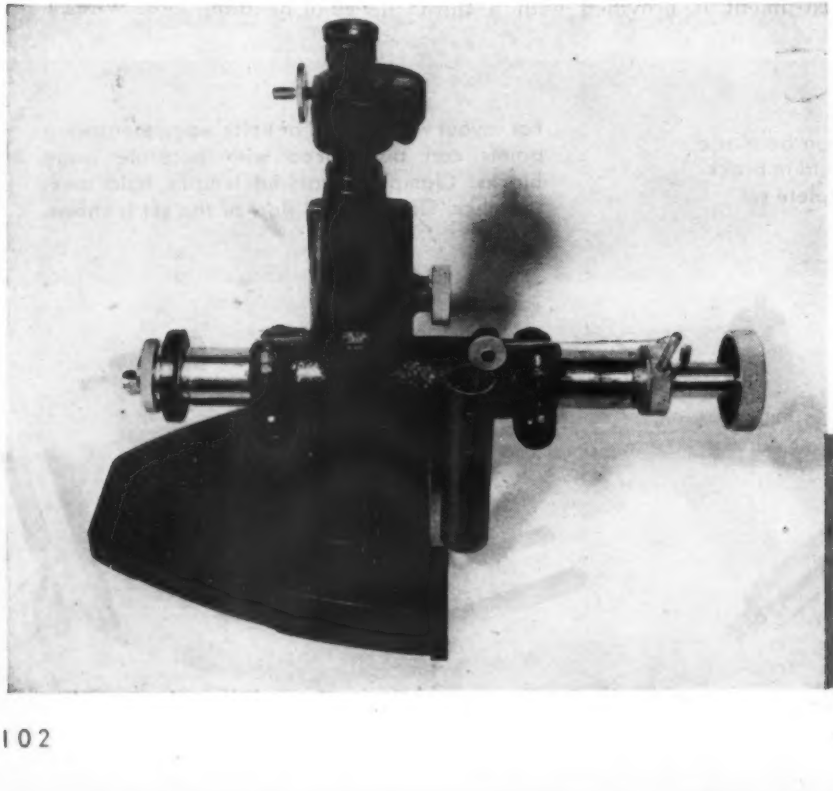
Efficiency Lost Underground

Like other segments of German industry, precision instrument plants went underground. Two Zeiss plants near Jena for example larger in capacity than the old perwar Zeiss works were built in old salt mines. Questioned as to the productive efficiency of underground operation, German managers admitted that it added 30 percent to the cost of production as compared to surface plants. Difficulties of moving men and materials in addition to the bad psychological influence of underground working conditions account for the inefficiency. Lighting in subsurface plants was poor, but this was true also of those above ground. Fluorescent and mercury vapor lighting was rarely encountered.

German plants, however, showed no dearth of measuring devices nor cutting tools. Indeed the suspected shortage in tungsten was not evident. Plenty of machine tools were available for German plants, and many of them were still waiting to be installed when the war ended.

Many plants had duplicate sets of precision measuring instruments kept in bomb cellars for use in case their surface installations were bombed out.

What really hurt was the almost total desrtuction of German transportation systems. Manufacturing plants could and did hide underground. But roads, railways and bridges were at the mercy of Allied air power. And they were wiped out.



This microscope gives linear readings on cam contours or other irregular surfaces. It is usually used in conjunction with an optical dividing head

This cam-controlled grinding fixture easily is adapted for sharpening either three or four-fluted ship plate countersinks ½ to 3 in. diameter with 50 to 90-deg. included lip angles. Hand pressure against the spindle maintains contact of a plate with three or four buttons which ride over the cam rise so as to advance or withdraw the body of the countersink to or away from the face of the grinding wheel as the cutter is rotated

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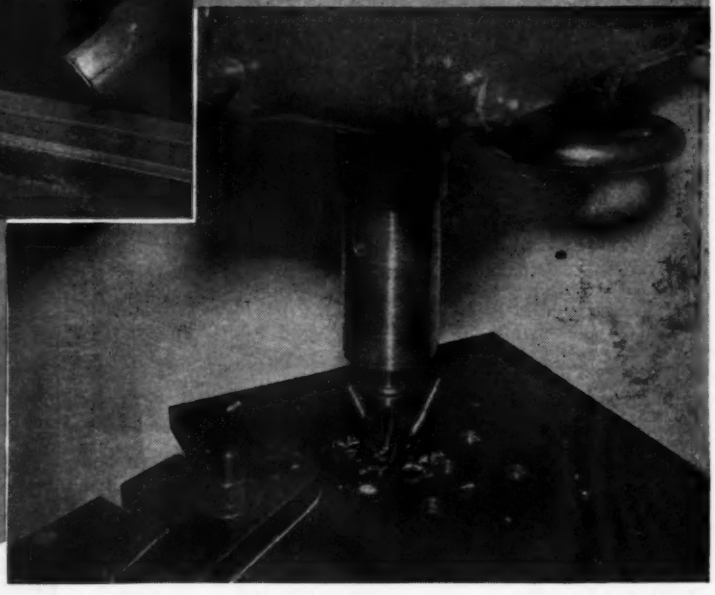


Tightly packed chips of equal size rising from each flute of the countersink show that it is properly ground and accurately centered in the hole. Investigation of countersink designs show that cutting faces should be radial, not hooked. Both straight and helically fluted countersinks are used

Cam-Actuated Fixture Sharpens Countersinks

BY W. E. AINSWORTH, MASTER MECHANIC, CENTRAL TOOL SHOP, PUGET SOUND NAVY YARD

COUNTERSINKS which have three and four straight or helical flutes and with included lip angles of 15 to 90 deg. can be sharpened quickly and accurately through the use of a simple cam-actuated fixture developed in the Central Tool Shop of the Puget Sound Navy Yard. This fixture is designed to accommodate ship plate countersinks ranging from ½ to 3 in. in diameter.

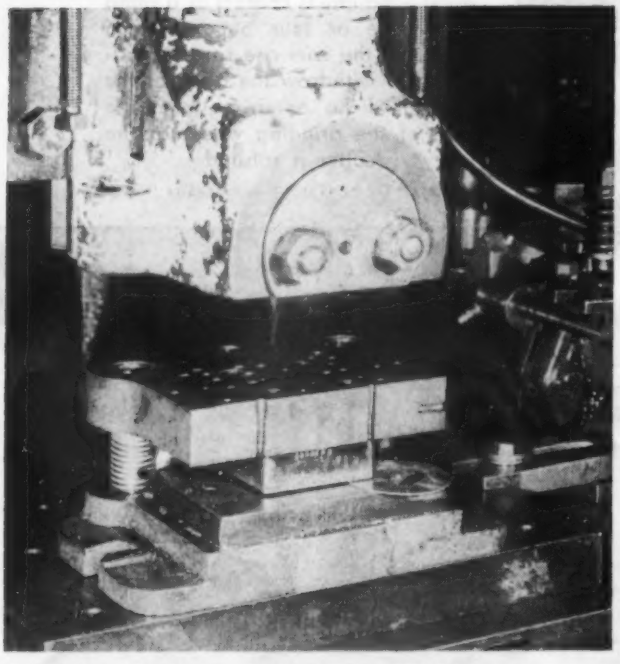
Included in the design of this fixture is a single-rise plate cam which is fixed in position in the fixture body. On the spindle is mounted an interchangeable plate with three or four contact buttons, depending upon whether three- or four-fluted countersinks are to be sharpened. With the fixture properly positioned in relation to the face of a cut-type grinding wheel, the operator holds the spindle of the fixture forward so that the buttons on the plate ride over the cam lobe as the spindle is rotated.

A swing-type centering gage on the front end of the fixture has a lip against which one lip of the countersink is set when locating the countersink in the fixture. This insures that the cutting edges of the countersink are kept in proper relation with the buttons which ride the cam rise.

Most of the ship plate countersinks used in the Puget Sound Navy Yard are ground with a relief angle which gives an indicator drop of 0.003 in., a distance of 3/16 in. back of the cutting edge. For other materials, which require different relief angles, a graduated knob on the fixture varies the relation of the cam with the teeth of the countersink so that other relief angles are ground automatically.

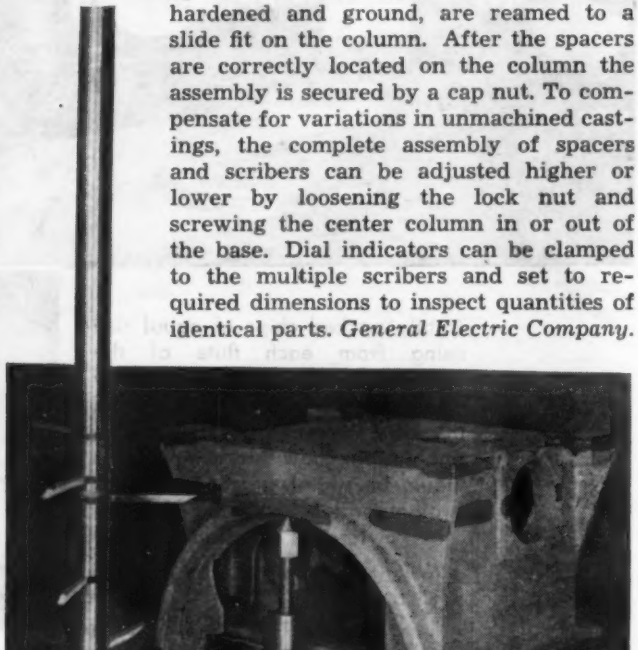
Note: The opinions or assertions contained herein are the private ones of the author and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

SHOP SHOTS

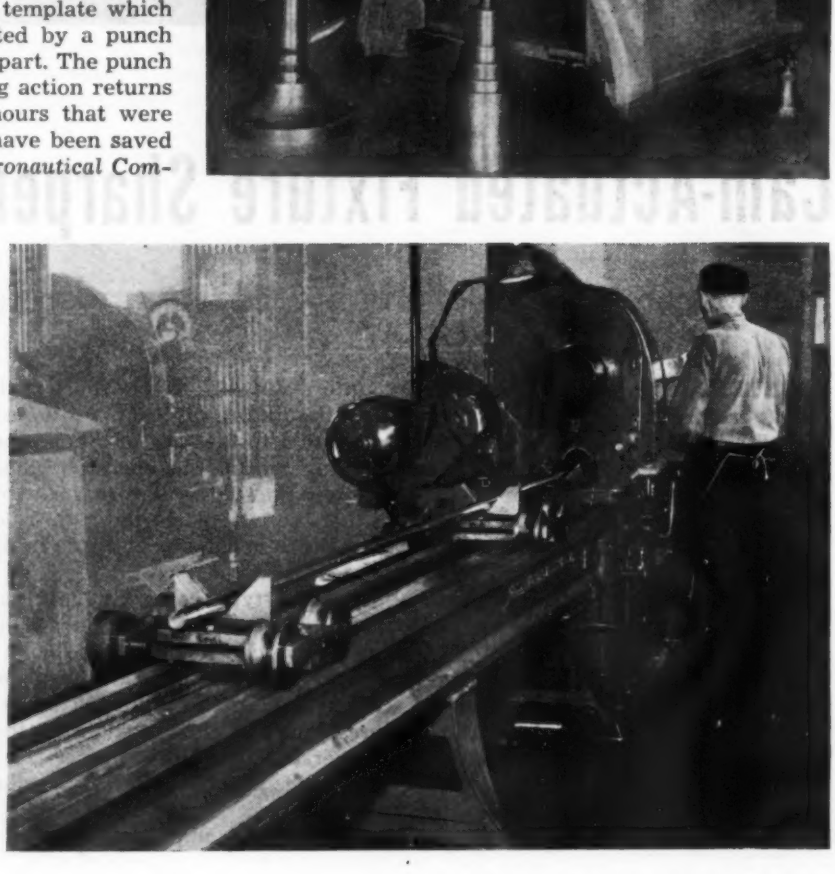


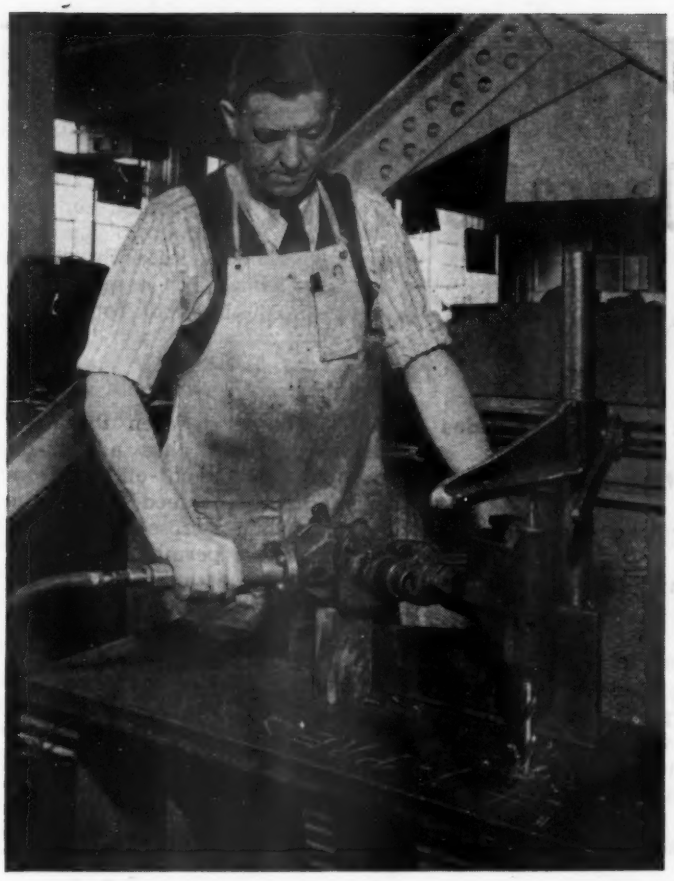
Sheet metal parts required in quantities too small to justify the making of blanking dies may be quickly and accurately produced by using a nibbling die on a punch press. The metal is fed between the male and female parts of the die by means of a template which contacts the punch. The die is actuated by a punch press and shears the metal to form the part. The punch press forces the punch down and spring action returns it to its former position. Many manhours that were formerly spent in hand-cutting parts have been saved by this method. *M. S. Clark, Ryan Aeronautical Company.*

A multiple height gage simplifies the scribing of castings, and reduces layout time. The gage consists of a center column threaded into the base and secured by a lock nut. Spacers and scribers, hardened and ground, are reamed to a slide fit on the column. After the spacers are correctly located on the column the assembly is secured by a cap nut. To compensate for variations in unmachined castings, the complete assembly of spacers and scribers can be adjusted higher or lower by loosening the lock nut and screwing the center column in or out of the base. Dial indicators can be clamped to the multiple scribers and set to required dimensions to inspect quantities of identical parts. *General Electric Company.*

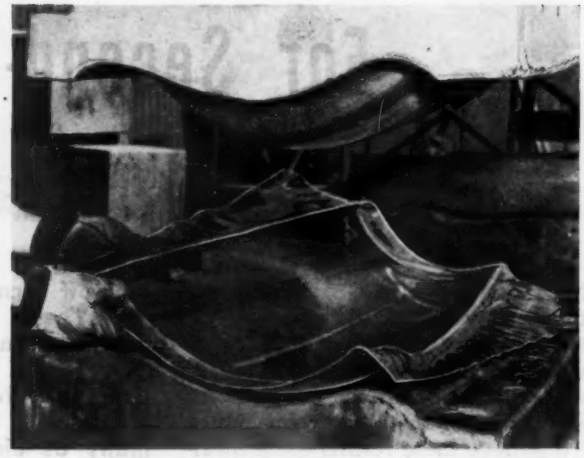


Abrasive cut-off operations have been speeded up by providing a stock guide and support for commercial abrasive cut-off machines. As the parts to be cut off are truly guided through the machine by two roller carriages no subsequent finishing of the ends is required. Bars up to 20 ft. long can be handled by this arrangement. An outmoded 18-in. Axelson lathe bed and legs form the base for the support unit shown in the photograph. In the same shop similar units made of structural steel are in use. *Axelson Manufacturing Company.*

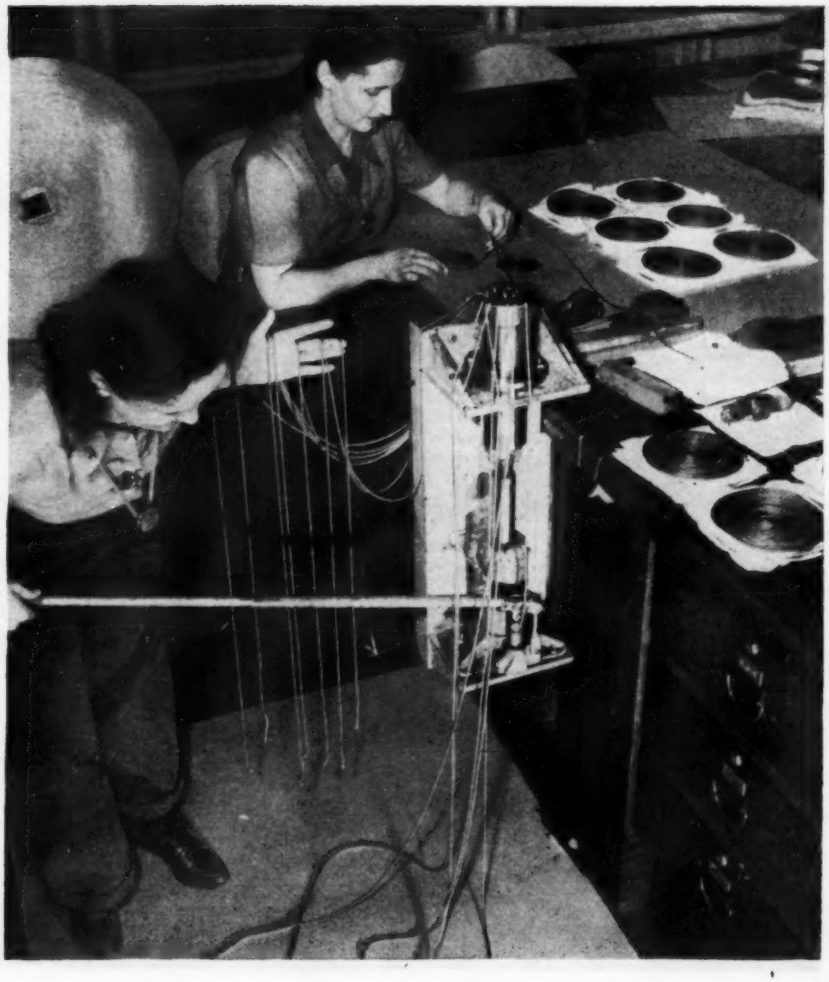




A compact geared feed unit applied to the spindle of a portable pneumatic drill motor, under an "old man" clamp, provides constant feed and lengthens the life of twist drills. When hand feeding, a variable pressure was applied from time to time. This resulted in the drill turning without removing any material and caused abrasion on the drill point. In this application differential gearing causes a feed pressure shaft to extend above the housing at a constant rate as the drill is rotated. *Puget Sound Navy Yard.*



A tow motor, used in conjunction with zinc and lead drop hammer dies originally made for fabrication of metal parts, facilitates inexpensive production of transparent plastic "mock-ups" or full scale models. The tow motor lowers the lead punch on the heated acrylate sheet, avoiding the tearing action on the rapid drop hammer action. After several minutes the punch is raised and the formed part removed. *Consolidated Vultee Aircraft Corporation.*



Strands of sealing compound are used to fill the crevices on the aluminum skin of pressurized sections of the B-29 Superfortresses. Because the compound is hard and not sufficiently pliable, chunks of the material are inserted in a cylinder. A hydraulic jack forces the compound through a grid and it emerges in strings. The strands are neatly wound up like a hawser for storage. *Boeing Aircraft Company.*

Special Feeds Adapt Automatics For Second-Operation Work

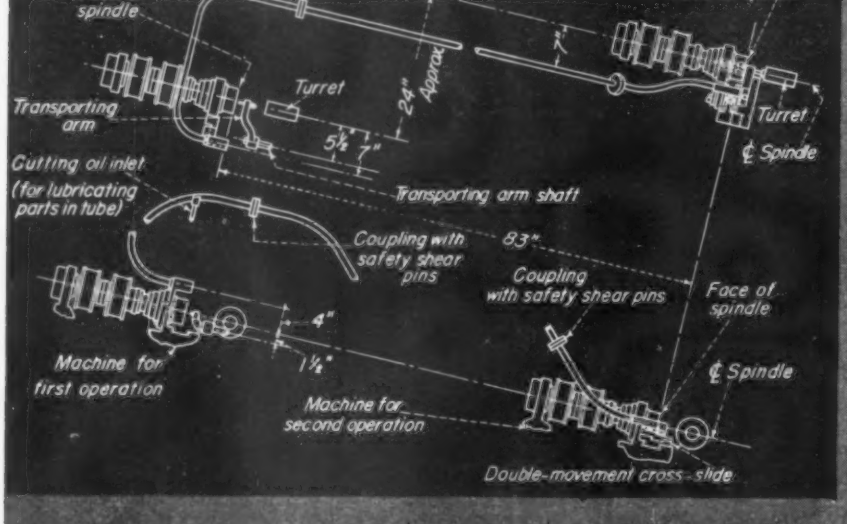
BY BEN C. BROSHEER, ASSOCIATE EDITOR, AMERICAN MACHINIST

Pick-off arms and cross-slides are used in transferring work. One operator can supervise as many as eight screw machines

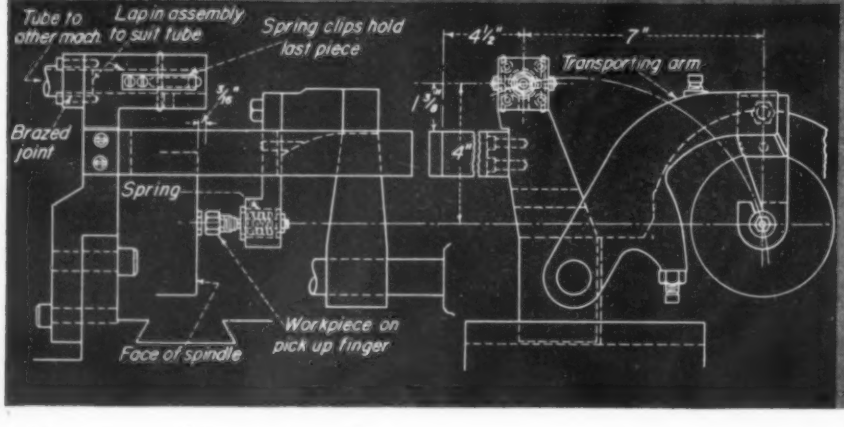
MATERIAL SAVINGS in manufacturing costs frequently can be made by adapting single-spindle automatic screw machines for second-operation work instead of setting up such jobs on hand screw machines. To achieve these results economically, means must be provided either for feeding the parts automatically from the first-operation machine directly to the second-operation machine without attention from the operator, or for loading the parts produced in the first-operation machine into magazines which can be mounted on the second-operation machine for automatic feeding. Both of these methods have been used successfully in the plant of the Carter Carburetor Corporation.

The needle valve body for one carburetor is made from 9/16 in. hexagonal brass rod in two operations on No. 2 Brown-Sharpe automatic screw machines. A tube-type feed can be used when the first-operation machine has a pick-off arm to transfer the cut-off part from the spindle to the feed end of the tube, and when a cross-slide on the second machine permits transfer of the pieces, one at a time, from the discharge end of the tube to the collet chuck in the machine spindle.

The feed tube connecting the two machines is suspended from the ceiling and has two couplings with safety shear pins which break if parts jam inside the tube. Timing of the two machines so that their operating cycles are the same, or so that the cycle for the second-opera-



Carburetor needle valve bodies are made complete in two set-ups on No. 2 Brown & Sharpe automatics. They are delivered from the bar machine to the chucking machine automatically through a connecting pipe line

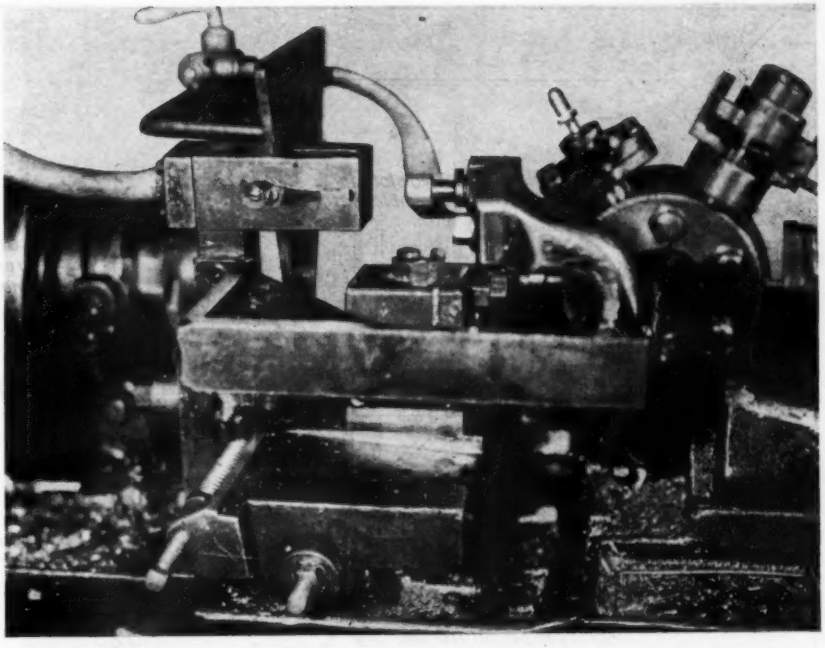


This assembly is mounted on the first-operation machine for inserting carburetor needle valve bodies into the feed tube for delivery to the second machine. Such an arrangement is possible only when the first-operation machine is equipped with a pick-off or transporting arm

tion machine is slightly faster than that for the first-operation machine, prevents jamming. The inside of the tube is lubricated with cutting oil pumped from either machine to an inlet near the top of the tube run, thus assuring free passage of the parts through the tube. Each machine produces about 200 pieces per hr. Cost of the second operation was reduced about $0.0025 per piece by using this automatic feed arrangement instead of the hand screw machine set-up formerly employed for the second operation.

Pick-Up Finger Used

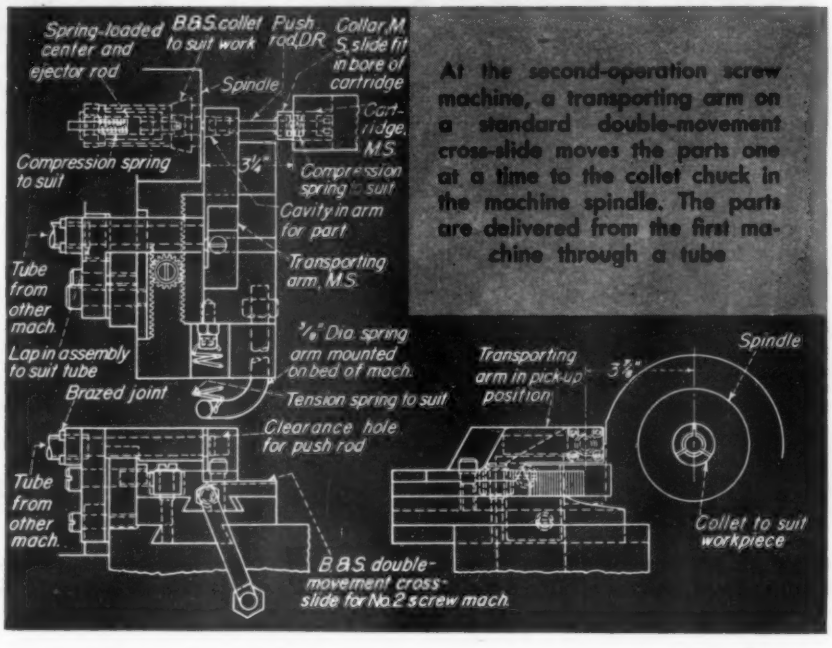
The pick-off or transporting arm on the first-operation machine is equipped with a spring-loaded finger which is inserted in the bore of the piece during the cut-off portion of the machine cycle. The finished piece then is moved by the transporting arm through an arc of approximately 90 deg. to the feed end of the tube unit. The center of the feed hole in the tube bracket is 4 in. above and 7 in. to the left of the center of the machine spindle. When the transporting arm reaches the upper end of its stroke it is moved forward sufficiently to enter the head end of the workpiece into the hole in the feed bracket. Spring clips on each side of this bracket catch on the head of the workpiece so that it is withdrawn from the pick-up finger when the transporting arm is returned. The pressure exerted when entering the piece into the feed bracket forces pieces previously inserted in the bracket up through the tube to the top of the tube run. From that point, the downward path of the tube permits the pieces to slide by gravity to the discharge unit at the second machine.



In this view, the pick-off arm is shown at the top of its travel, ready to move the part into the feed tube bracket. Operation is entirely automatic

In the arrangement of the feed unit on the second-operation machine, the bracket into which the parts are discharged from the feed tube is mounted beside a standard double-movement cross-slide. This cross-slide carries a transporting arm in which there is a cavity to hold one part at a time. When the cross-slide is withdrawn from the machine spindle, this cavity is brought into line with the end of the tube in the bracket. Pressure of other parts sliding through the tube forces the part ahead into cavity. Then, when the next feed cycle is started, this part is moved forward by the transporting arm to a position directly in front of the three-jaw collet in the machine spindle.

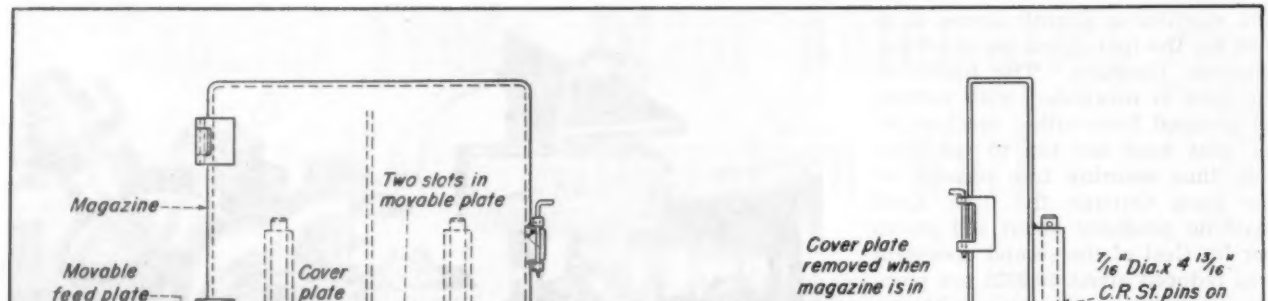
A spring-loaded rod carried on the turret of the automatic screw machine enters through a clearance hole in the bottom of the cavity in the transporting arm and moves the part into the spindle collet. This compresses a spring-loaded ejector rod inside the spindle which later is used to eject the part from the collet when the work cycle has been completed. When the piece has been inserted in the collet, the collet is closed, the transporting arm and the turret push rod are withdrawn, and the machining cycle of this second machine is initiated. So little time is required on the part of the machine operator for either the first-operation machine or the second-operation machine that he supervises the work of eight automatic screw machines in this line.


Spring-loaded center and ejector rod
B&S collet to suit work
Push rod, DR
Collar, M.S. slide fit in bore of cartridge
Spindle
Cartridge, M.S.
Compression spring to suit
3¼"
Compression spring to suit
Cavity in arm for part
Transporting arm, M.S.
Tube from other mach.
Lap in assembly to suit tube
Brazed joint
⅛" Dia. spring arm mounted on bed of mach.
Tension spring to suit
Clearance hole for push rod
Tube from other mach.
B&S double-movement cross-slide for No. 2 screw mach.
Transporting arm in pick-up position
3⅞"
Spindle
Collet to suit workpiece

At the second-operation screw machine, a transporting arm on a standard double-movement cross-slide moves the parts one at a time to the collet chuck in the machine spindle. The parts are delivered from the first machine through a tube

Part Must Lend Itself

There are times, of course, when the shape of the part, or the equipment used does not permit employment of direct-delivery feed systems like the one just described. This may be because the shape of the part will not permit it to feed freely through a tube, or because of the lack of a pick-off arm for transferring the part from the machine spindle to the feed tube. In such


Magazine
Two slots in movable plate
Movable feed plate
Cover plate
Tie rod
Die springs to suit
Cover plate removed when magazine is in position on machine
7/16" Dia. x 4 13/16" C.R. St. pins on 5 1/16" centers
1" Movement
Fixed feed plate
Fixed bracket
Spindle
Chute
Fixed bracket
One slot in fixed plate permits parts to feed into chute one at a time.
Chute
Bracket at rear of machine
Double movement cross-slide: Ratio 2 to 1
Spring to permit transporting arm to swing below work in collet.
2 1/4" Stroke
1 1/4" Stroke of rear slide

Automatic feed of tubular parts for fuzes is accomplished with this magazine-type unit. The 7/16 in. diameter, 1 19/32 in. long tubes are delivered to the collet chuck one at a time without attention from the operator

cases, other means must be employed for feeding parts automatically to screw machines arranged for second-operation work. One such arrangement consists of a magazine for holding the cylindrical parts and a mechanism for transferring the parts one at a time from the magazine to the collet chuck of a No. OG Brown & Sharpe automatic screw machine.

The magazine is mounted on a bracket above a movable feed plate which is actuated by a bracket on the rear cross-slide. This plate has two slots, each of which is large enough to accommodate one part. Under the movable plate is a fixed feed plate in which there is a slot large enough to pass one part at a time into a chute leading to the loading station above a transporting arm carried by a double movement cross-slide. This slide has a 2¼-in. stroke. The transporting arm is hinged on the cross-side and is spring loaded to hold it in a horizontal position except when it is being withdrawn from in front of the collet chuck. Movement of the top feed plate under the parts in the magazine insures that a part will be picked up by one or both of the slots in this plate. This, in turn, insures feeding parts from either slot into the chute.

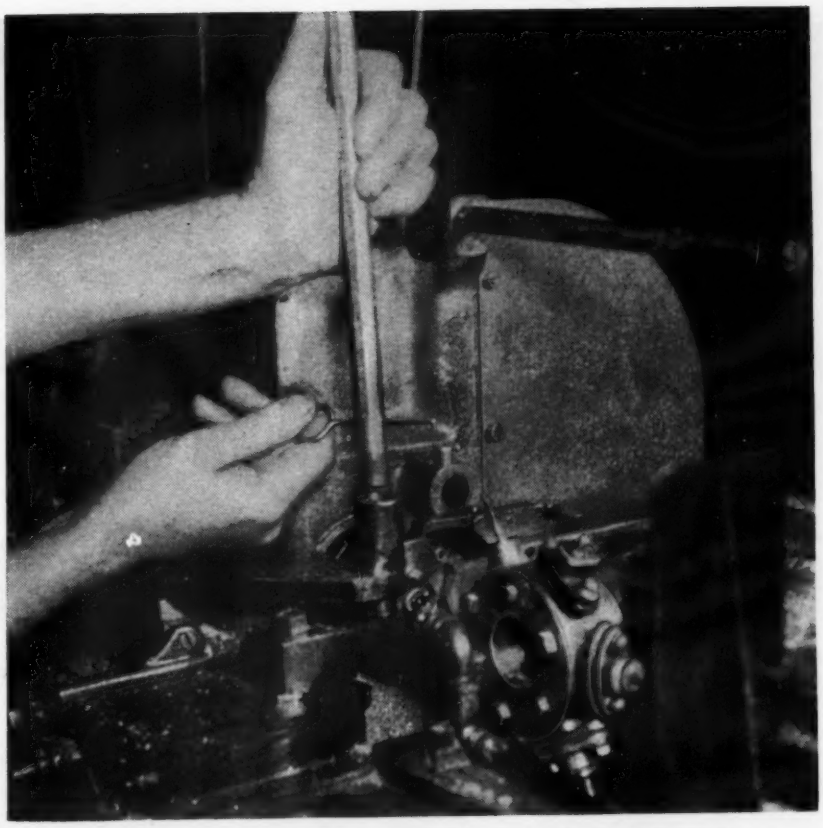
Magazines are interchangeable, and the operator can load spare magazines for a battery of automatics while the machines are in operation. Each magazine holds 360 parts

The parts, which are steel fuze tubes approximately 7/16 in. in diameter and 19/32 in. long, are loaded by hand into the magazines at a work bench. A cover plate is inserted in the slot at the bottom of each magazine when it has been loaded, to insure against the parts dropping out when the magazine is mounted on the bracket of the screw machine. When the magazine is in position, this cover plate is withdrawn to permit the parts to feed into the slots of the feed plate. A total of 360 parts can be loaded into each magazine, giving a 30-min. machine capacity when the machine cycle is 5 sec. per piece. Formerly, when the second operation on these parts was performed in hand screw machines, about 2,000 pieces were produced from each machine in an 8-hr. shift. With the present magazine feed arrangement on automatic screw machines, the production per second-operation machine averages about 4,800 pieces in an 8-hr. period. Production thus is almost 2½ times the previous level, and scrap has been reduced better than 50 percent.

Simple Feeding Method

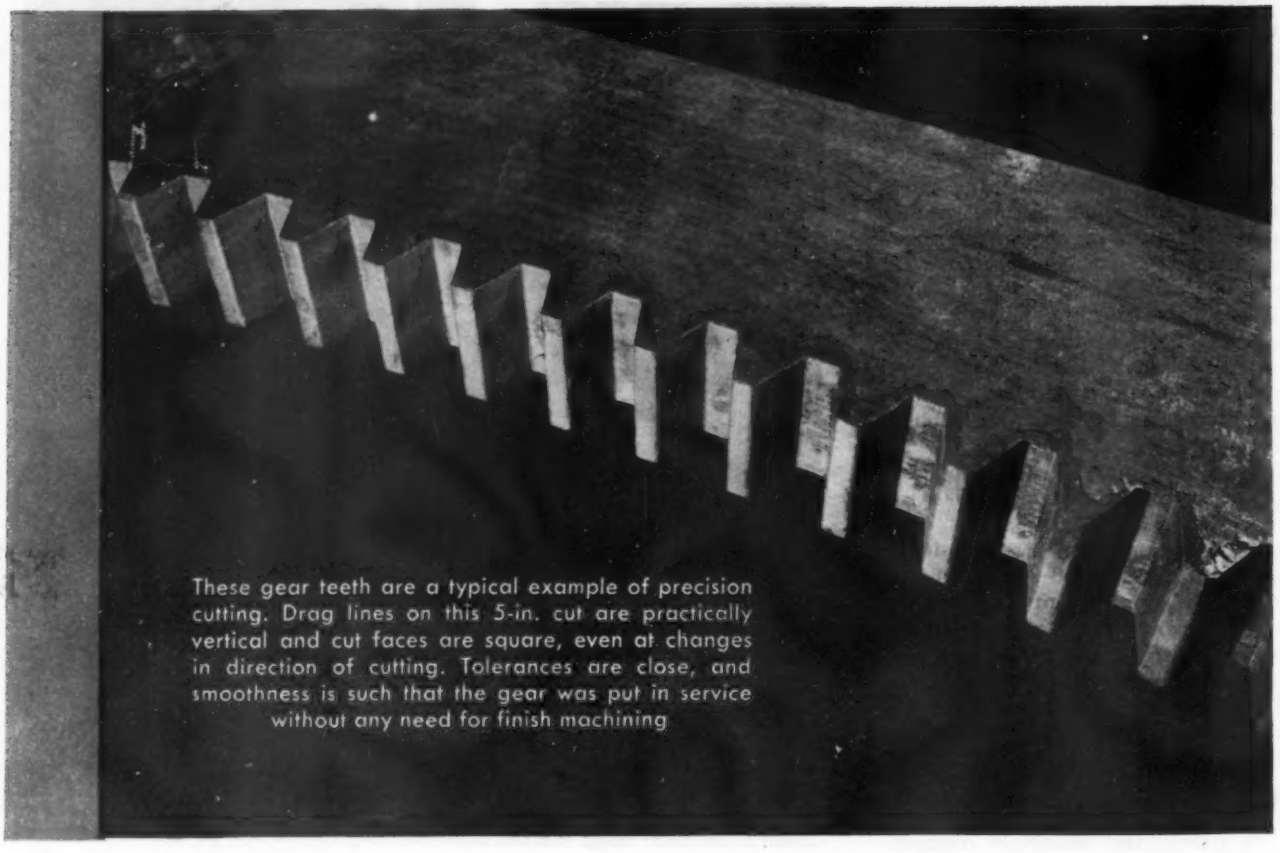
A simple and relatively inexpensive method is used for feeding small 15/32 in. diameter and 5/32 in. long slugs to a No. 00 Brown & Sharpe automatic screw machine set up for a second operation on brass fuze rotors. The feed magazine consists of a length of steel tube long enough to hold 150 slugs. Since it is essential that the diameter of each slug be held within close limits, gaging must be 100 percent. This gaging operation is combined with the filling of the magazine tubes by mounting gage jaws on top of the steel block under which the tubes are mounted for filling. As the parts are moved individually by hand to the filler hole in the block, they are passed between the jaws of the "go" snap gage on top of the block. It will be noted that the inspector uses both hands to move the parts from a tray across the top of the filler block. A pin in one end of the magazine tube insures that the slugs do not drop out of the tube when it is moved to the machine. This cross pin is withdrawn after the tube has been set vertically in a bracket on the cross-slide of the automatic screw machine.

With this comparison of low-cost adapting fixtures, the operations of individual single-purpose machines are coupled and the necessity for providing special multiple operation machines avoided.



Small brass rotor slugs are fed automatically to this No. 00 Brown & Sharpe screw machine from the tube shown being positioned by the operator. The cross-pin holds the parts in the tube while it is being transported to the machine and erected in the automatic transport mechanism

Brass rotor slugs are gaged for diameter while they are being loaded into the feed tubes. The loading block has gage jaws between which the parts are slid toward the hole in the block



These gear teeth are a typical example of precision cutting. Drag lines on this 5-in. cut are practically vertical and cut faces are square, even at changes in direction of cutting. Tolerances are close, and smoothness is such that the gear was put in service without any need for finish machining

Variables in Cutting Drag

BY DR. G. V. SLOTTMAN

APPLIED ENGINEERING DEPARTMENT AIR REDUCTION SALES COMPANY

PRESENT STANDARDS of quality in commercial machine gas cutting are quite high. On production work, flame-cut parts may legitimately be required to have smooth and uniform cut surfaces with sharp edges. The contour must be true to prescribed dimensions, and where further machining is to be done the tolerance allowed should be held to a minimum, so that machining time need not be unnecessarily extended. These requirements are not excessive; they can readily be met by skilled operators following recommended procedures.

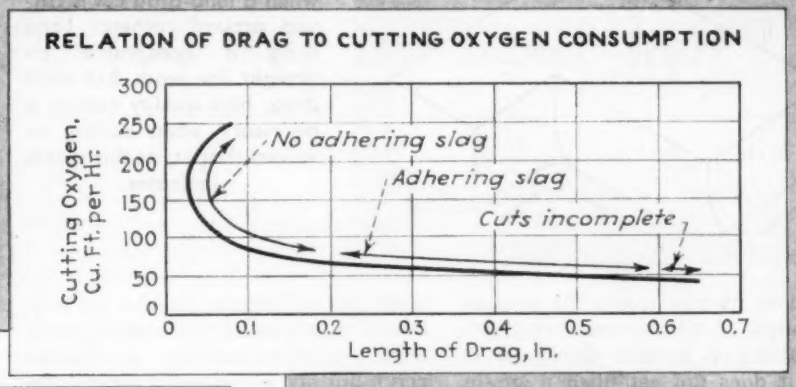
A wealth of material has been published detailing the results of controlled observations of the interrelations among the principal variables—tip size, oxygen pressure, and cutting speed—in cutting each thickness of steel. An analytical comparison of these data reveals considerable disparity between the operating conditions used and recommended by various authorities to secure comparable results, indicating that there is a range of conditions within which equivalent cuts can be made. Steel analysis also enters into the picture to influence the operating set-up.

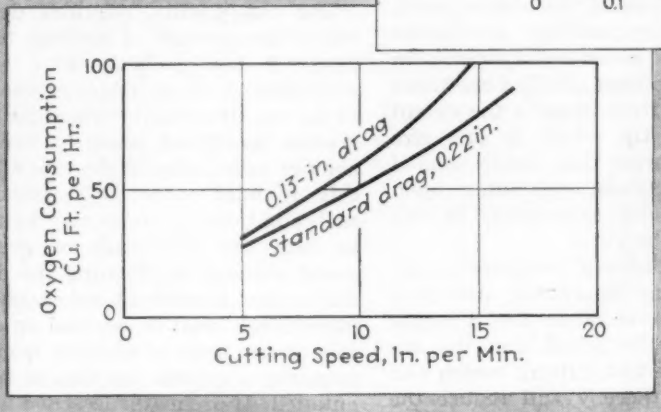
Factors relating to drag length and cutting tips are discussed in this article, the fourth in a series on oxyacetylene cutting

Since no hard and fast rules can be laid down, it becomes necessary for the operator to understand the effect of each variable in basic terms so that he can make his own adjustments intelligently, according to the type of steel being worked and the cutting equipment used. Because a full discussion of all the evidence might easily become confusing, and would be of little practical value to most operators, this discussion will endeavor to present a usable guide, highlighting the major variables and giving secondary attention to the lesser factors.

Of all the factors involved in cutting, the length of drag may logically be considered the best initial reference point in determining the most economical cutting conditions. Drag is the distance the bottom of a cut lags behind the top side, as revealed by the slightly

Relation between drag and cutting oxygen consumption, showing the length of drag which results when different oxygen pressures are used without changing the speed. In this test case on 1-in. 0.13 carbon steel, a No. 52 orifice tip was used at a speed of 9.3 in. per min.





This chart shows that for any given drag length desired, there is an almost straight-line relationship between the speeds and cutting oxygen consumptions which can be used to secure that drag. Thus it is good economy to use the highest speed consistent with the size of tip. These tests were made on 1-in. steel with a No. 56 orifice tip, but a similar proportionality holds true for all common thicknesses of material

Govern Economical Operations

curving lines left by the oxygen jet on the face of the cut. The quality of cut is directly proportional to the length of drag, since the conditions which result in a short drag will also produce smooth, square cuts with sharp edges and without adhering slag.

The amount of drag is influenced by the tip size, initial temperature of the steel, and amount of preheat, but is governed principally by speed and oxygen pressure. A reduction in cutting speed or an increase in pressure within the efficient operating range of the equipment will reduce the drag and improve the quality of cut. On the other hand it is evident that either of these changes will increase the cost of cutting, either by reducing the amount of work done per hour or by causing an increase in gas consumption.

Therefore, for any particular cutting job, best economy will be secured by making the cut no smoother than is required on the finished piece. It should be noted, however, that the difference in cost between high-quality cutting and high-speed cutting ranges between only 2 to 7 percent, approximately, of total cost. Such small savings are disregarded in many shops in favor of producing consistently high-quality work.

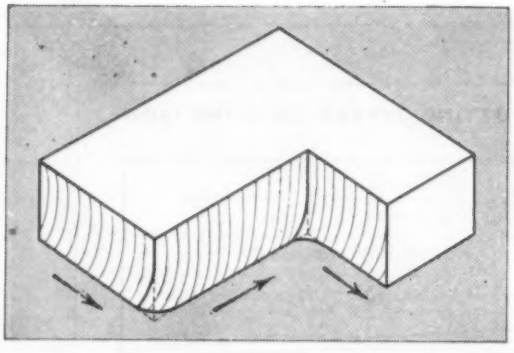
An accompanying chart illustrates drag and its relation to oxygen consumption, showing that for any fixed speed of cutting, variations in cutting oxygen pressure produce corresponding changes in drag length between a minimum, beyond which increases in pressure actually serve to increase the drag, and a maximum at which the cut fails to penetrate. In the practical operating range where there is no adhering slag, it should be noted that fairly considerable reductions in drag are at first secured with comparatively minor increases in pressure, but that as drag approaches the minimum, great increases in oxygen are needed to effect even a slight reduction in drag. It is thus poor economy to adopt the minimum or "zero drag" as the basis for cutting under average conditions.

Yet the range of cutting conditions which produce successful cuts with varying quality and economy is so broad as to make it desirable to establish some standard conditions at which good quality cuts can be secured at low cost. Such a standard has been found, and widely adopted. It is known as the "standard drag" cut, made with the maximum possible drag which will complete the cut and "drop" the piece without leaving a final uncut corner. Table 1 gives standard drag lengths for common thicknesses of steel.

While the acceptance of standard

TABLE 1

Thickness, In.	Approx. Length of "Standard" Drag, In.
1/2	3/32
1	13/64
2	7/32
2 to 6	1/4



Extreme example of out-of-square faces of cut resulting when a long-drag cut is carried around corners. Long drag is acceptable on straight line work, but short drag, high-quality cutting is necessary when cutting involved shapes, as this sketch indicates

drag does narrow down the confusing range of adjustments available for cutting a certain thickness of steel, it does not establish a single, rigid set of conditions. Whether standard or a shorter length of drag is decided upon for the work at hand, there is still a choice of combinations of machine and gas adjustments which will produce that length of drag. The operator is the judge of which combination to use to secure the quality of results and the economy desired. It is obviously most economical to cut at the fastest speed which will produce an acceptable drag length and quality of cut.

Short Drag for Precision

Since short-drag cuts are generally of high quality, and long-drag cuts of lower quality, the operator may be guided in this selection of drag length by the quality requirements of the cut. In straight line cutting there is somewhat wider latitude, however, the quality being less affected by long drag lines here, since these always lie in the plane of the cut. But in cutting involved shapes, a long drag will cause appreciable out-of-squareness at changes in direction of torch movement, making the bottom contour of the cut different from the top. It is necessary, therefore, to make contour cuts with a short drag, particularly on heavier material. Precision cutting, whether straight or curved, always required high quality, short drag cuts, sacrificing oxygen economy for smoothness and dimensional accuracy.

Where nothing but severance is demanded of the cut, the drag may be the longest possible, disregarding quality for speed and economy.

Tip sizes are designated by number, graduating upward with increases in diameter of the central orifice through which the cutting oxygen issues. The size of tip to use is determined by thickness of material to be cut, and while one size of tip will cut a range of thicknesses, the recommendations of the equipment manufacturer should be followed in choosing the correct size. Such recommendations are never rigid, but are based on experience in average conditions. Skilled operators may depart from them to the extent of using a tip which is one size smaller or larger than recommended for the thickness, depending upon preference and experience on the material to be cut.

There is a natural tendency on the part of many operators, and even among supervisors, to use a larger tip size in the belief that the increased speed of cutting which can be secured thereby will reduce the cost of cutting. This may in some cases be true, but when a certain minimum of drag is required of the cut, the saving in labor and overhead is usually trivial as compared with the increased oxygen cost. This practice might prove advantageous where unit labor costs are high and unit oxygen costs are low, but in general the use of larger tips is justified only when they result in more dependable or cleaner cutting.

Proper Sizes of Tips

Oversize cutting tips naturally cut a wider kerf and consume more oxygen, even if lower oxygen pressure is employed. On the other hand, should a misguided operator attempt to employ an undersize tip for the thickness being cut, at increased pressure, in the belief that a narrower kerf and consequent economy will result, he will be disappointed. Excess pressure causes the oxygen jet to expand in the kerf, as well as to swirl, thus not only widening the kerf but producing irregular cut faces as well.

Departures from recommended tip sizes sholud therefore not be made without knowledge of the efficient operating speed and pressure ranges of the tips, unless trial and error test cuts are made before-hand.

A wide variety of cutting tips of different styles is available in each size, providing light, medium or heavy preheat according to the surface condition and composition of the material. Thus, for a given cutting job, the *size* of tip required is determined by material thickness, while the surface character and the cuttability of the steel govern the preheat value or *style* of tip selected. The preheat value should be no more than needed to maintain a progressive ignition point on the top surface of the steel. There is no advantage in excessive preheating. On the contrary, it wastes gases and also tends to melt down the top edges of the cut and widen the kerf.

The cut quality required determines the amount of preheat to be used. A low preheat value gives well-defined, sharp edges at the top of the cut. Increased preheat permits greater speed but tends to leave a heavier rolled edge at the top. Where this rounded edge is permissible, such additional preheat may be used to gain the advantage of greater speed without lengthening the drag. Reductions in preheat value, on the other hand, must be decided on each job, on the basis of whether over-all economy warrants the loss of speed entailed. If preheat is lessened without reducing speed, the drag becomes longer, possibly even to the extent of losing the cut.

The purpose of a cutting tip is to project a stable oxygen stream of great length, and maintain the cylindrical characteristic of the stream without undue deflection, swirl or expansion. To produce satisfactory gas cut surfaces, the cutting orifice must be smooth and straight, free from nicks, burrs or adhering slag at the exit end. The exit should not be distorted or rendered crudely bell-mouthed by improper or careless cleaning methods. The preheating orifices should also be kept in good condition. Care exercised in maintaining cutting tips in the condition supplied by the manufacturer will produce consistently satisfactory results.

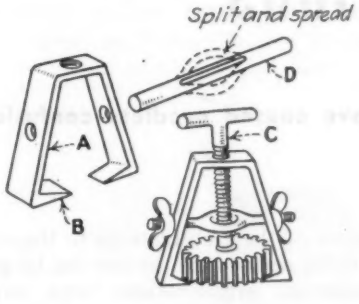
Tips should never be struck on a metallic surface, or hammered, to remove scale adhering to the surfaces. Removal of extraneous matter should be done carefully and with proper equipment. Orifices should never be cleaned with the cutting lips of a drill. This action produces a conical section at the jet which acts as a turbulence chamber, causing the gases to malform the edge.

The next chapter in this series will be devoted to the operations involved in setting up work, positioning the torch, starting the cut, and correction of a cut in progress.

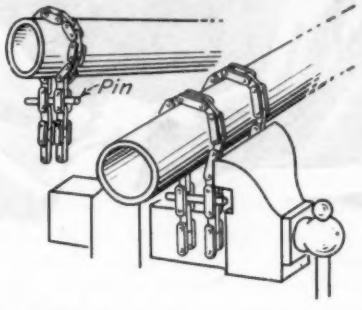
Short Cuts FOR THE SMALL SHOP

BY A. H. WAYCHOFF

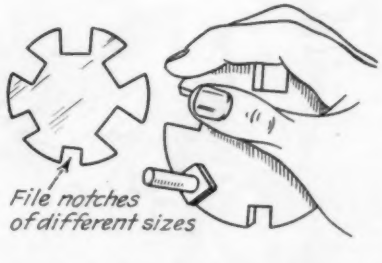
WIRE can be unrolled without kinking or tangling with the aid of a roly-poly device. Take an old differential-case cover, set an eyebolt about 2 ft. long upright in the bottom of the bowl and fill the bowl with concrete. Set the roly-poly in the center of the coil, put the free end of the coil through the eye and pull. The weight of the device holds it in place, but the eyebolt is free to lean as necessary for lifting the wire straight. Furthermore, the rounded bottom of the roly-poly permits it to turn as required.



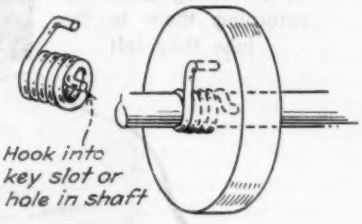
GEAR PULLERS may not be on hand when wanted, so here is a way to make one at small expense. A yoke *A*, formed up from ¼ x 1½ in. iron, will generally serve. Sharpen the ends *B* of the yoke to a wedge shape. Drill and tap the top of the yoke for a puller screw *C*. A crossbolt *D* for adjusting the spread of the yoke feet completes the assembly. To make this bolt, take a piece of ⅝ in. rod, thread each end for a wingnut, and split the center a couple of inches, then spread to form an eye. Holes are drilled in the side members of the yoke to receive the crossbolt, and the puller screw is passed through the eye. To use the completed puller, loosen the wingnuts until the feet of the yoke will slip under the article to be removed from a shaft. Then tighten the wingnuts and turn down the screw until disassembly is effected. The puller can also be used as a spring spreader.



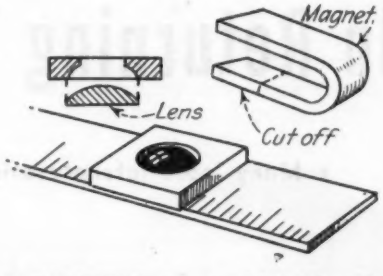
CHAIN VISES are ordinarily used to hold large pipe. If a chain vise is not available, a small bench vise and two short lengths of bicycle chain will do. Wrap the two pieces of chain around the pipe, and slip a small pin through the links of each piece. Space the chains so that they come near the ends of the vise jaws, which should be opened about one-third the pipe diameter. Drop the loose ends of the chains between the jaws and tighten the vise to draw the chains tightly about the pipe. The pipe will be held solidly and operations within the strength of the vise can be performed with ease.



POCKET WRENCHES which will fit various sizes of small nuts and oil-line fittings can be made by cutting a series of square notches in the periphery of a steel disk about 2½ in. in diameter. A wrench of this character fits in the pocket, is always easy to get hold of, and is handy for minor adjustments.



WOODEN PULLEYS on light equipment are so troublesome to key to the shaft, that it is seldom worthwhile to bother with them, even though they are quickly and cheaply made for experimental purposes. But a coil spring can be used instead of a key. Take a spring that fits the shaft snugly and of a length somewhat greater than the pulley width. At one end make a right-angle bend in the wire to engage a hole in the pulley, and make a sharp hook at the other end to slip into the keyway or a cross hole drilled in the shaft. With the pulley and spring assembled to the shaft, the harder the pull on the belt, the tighter the spring grips the shaft.



MAGNIFIERS for machinists' scales can be made of old permanent magnets with the advantage that no clip is necessary and the device is readily removed. Cut a piece ⅛-in. thick from an old magnet and make the width equal to that of the scale. Then drill a hole part way through the block and countersink it to receive a lens from a pocket flashlight. Use a small amount of shellac to hold the lens in place. In use, the magnifier is placed on the scale at any desired position, where it sticks because of magnetic attraction. On the other hand, it is easy to slide the magnifier to another position. When through with the magnifier, merely pull it off the scale and place in the pocket or toolbox. There are no clips to be attached to the scale.

A comfortable office atmosphere and understanding on the part of interviewers will go a long way with veterans in discussing plans for returning them to the jobs they left

Common Sense Will Go a Long Way In Returning Veterans to Old Jobs

- **Many loose interpretations of the laws relating to veterans have caused needless confusion**

COUNTLESS PROBLEMS have been projected into the hiring or rehiring of returning war veterans. Some of the problems are valid. But even a superficial examination of many of the questions raised offers convincing proof that alarmists have found fertile ground for sowing seeds of confusion and bewilderment.

For the most part, the fertile ground is represented in the countless small shops that have expanded to meet the production demands of war. These shops do not have a battery of legal talent to prepare rehiring forms which embrace all aspects of the law, nor do they have the personnel to set up specific departments for interviewing returning veterans.

Yet the small shops are just as aware of their obligations to the returning serviceman as are the larger industrial organizations who have studied and acted upon the veteran situation from all its angles. Some of the smaller shops have benefited directly from the plans of larger companies because the latter have been willing and anxious to pass their experience records along.

This button stands for honorable service to our country. The veteran wearing this button is proud of it. Employers will be just as proud to have these returned veterans in their employ

Even in this connection, however, each small plant has its own peculiar problems that cannot be solved by the elaborate forms and charts that have been drafted to meet situations confronting large companies. As a matter of fact, many heads of small businesses are adopting the philosophical attitude that plain common sense will fulfill their needs in the matter of taking back returning veterans.

There have been many stories relating to psychoneurosis and emotional instability on the part of returning veterans—combatants and non-combatants as well. These stories have done much to confuse many prospective employers and to make them leery of how men bearing such "tags" will react in civilian jobs.

Facts on Psychoneurosis

Actually, Army and Navy doctors have emphasized that psychoneurosis as applied to a veteran merely means that the man is no longer suited temperamentally to the rigors of military life or that he never was at the time he was accepted into the armed forces. Experience records have proved beyond doubt that most of these men need only normal living and working conditions in civilian life to restore them to complete stability.

"The men with obvious nervous disorders are rejected at the induction stations," reads an official explanation of the War Department. "The men who develop psychoneurotic symptoms during their training period are very apt to be the men who had similar symptoms in civilian life, but were able to get along without attracting attention.

"The stresses of Army life—radical changes of environments, regimentation, discipline, loss of emotional security as represented by family and friends—are all hazards to mental health. Many persons able to adjust themselves in the relative security of civilian life, who are useful and productive individuals, are totally incapable of adjusting to their Army environment."

This considered statement alone should remove any stigma attached to psychoneurosis. It should serve to offset completely the rantings of persons who have let the subject run away with their imaginations.

War Manpower Commission interviewers have revealed that a majority of veterans seek only a measure of understanding in their transition from trained soldiers and sailors to civilian status. They realize that there will be a readjustment period necessary but it will not reach the exaggerated proportions that have been preached in some quarters.

Percentage figures have varied on the number of returning veterans who will want their old jobs back. Under the G.I. Bill of Rights, veterans have a 90-day period in which to return to the job they left. The Selective Service Act states that the veteran will lose his reemployment rights if he fails actually to report for work until after the 90 days have elapsed, despite the fact that he may have applied for reinstatement within the time limit.

The Act further makes it mandatory that the returning veterans "... shall be restored without loss of seniority, shall be entitled to participate in insurance or other benefits offered by the employer pursuant to established rules and practices relating to employees on furlough or leave of absence in effect with the employer at the time such person was inducted into such forces, and shall not be discharged from such position without cause within one year after such restoration."

The laws governing returning veterans are couched in language which leaves interpretations a matter of conjecture. If the average employer sat down to read over and absorb the many points merged into laws he would become completely baffled. Such terms as "temporary" and "permanent" employee can have many interpretations. But here again it's a matter of using common sense until such time as court interpretations have been made.

One puzzling question facing employers involves their obligation to a succession of jobholders who subsequently entered the armed services. The Selective Service Act states that only the original jobholder is entitled to his job back as the others served as replacements. The exception is that if a permanent employee was transferred as a replacement and later entered the armed forces, both men are entitled to reinstatement to the permanent jobs they left.

Court Interpretations Needed

Many points in the Selective Service Act will have to be clarified by court decisions. For example, one section reads that an employer does not have to rehire a veteran if his situation is such that it is "impossible or unreasonable." An employer's definition of the word "unreasonable" might be worlds apart from

Plant managers will do well to keep in touch with foremen on how the returned veteran is readjusting to civilian work. Foremen are important cogs in this task

that of the veteran, and it appears that only a court case can determine which definition is right.

The bosses of small shops have had the advantage of a closer relationship with their employees. Many have corresponded with the men represented by a star in the plant's service flag. The men have expressed themselves more freely in letters concerning their plans for the future. These letters have exacted information that could never be obtained by sending the men cold, blank forms seeking future data.

Employers, regardless of the size of their companies, must determine whether the wounds of a disabled veteran limit his ability to perform the job he left. Large companies have made detailed analysis of their job structures with breakdowns on the work men can do with certain physical limitations. Many plants before and during the war have hired handicapped persons and this record has served as a good blueprint for the jobs available to disabled veterans.

Many companies are revamping their programs on the basis of wartime changes in manufacturing processes and products. In reevaluating jobs, the program should seek to uncover occupations that can be filled by veterans who are disabled or require extra training.

Give Vet Benefit of Doubt

The laws pertaining to the reemployment of returning veterans may be confusing but there is one attitude which will hold the employer in good stead—if a doubtful situation arises, resolve it in favor of the veteran. This applies to giving him back the job he left or its equal and to submitting to his qualified demands for seniority rating.

The law draws no distinction between those who have had combat duty and those in training, or between those who were drafted, volunteered or were commissioned. All are regarded as bona fide members of the United States land and naval forces. All are entitled to the same reemployment rights.

An employer's legal duty to rehire extends only to veterans with certificates of honorable discharge or discharge under honorable conditions. There is no obligation to rehire dishonorably discharged veterans; veterans with simple discharges or "bad conduct" discharges; conscientious objectors, even though they have worked under government supervision and have contributed indirectly to the war effort; and members of the Coast Guard Auxiliary.

From the cases in point to date, there is no doubt that all legal and administrative rulings give the veteran every possible benefit of any doubt. Authorities appear convinced that as questions arise in test cases, legislation will be advanced to favor the veteran.

An employer will do well to discuss the return of former employees with the foremen in his shop, be it big or small. Many booklets and articles have been written about the foreman's key position in the matter of making the returning veteran's job pleasant. This phase of the foreman's contribution to the smooth operation of plans for reemploying the returning veterans cannot be underestimated. The foreman will be in the position to make or break a returning serviceman's spirit. The medical world uses the high-sounding word of "psychology" but actually it amounts to foremen using their heads with their hearts during the veteran's readjustment period.

Many Employees Missed

Most of the advice given to employers seems to presume that they are going to fulfill only the obligations required of them by law. Many of the large companies are on record to the effect that they are going to "bend over backwards" to take care of returning veterans. The officials of small shops feel much the same way. As a matter of fact, some of the smaller shops are waiting anxiously for the return of the men who left their employ for the armed forces, because they know that these employees in absentia had the interests of the company at heart.

There is no concrete estimate of the number of metal-working employees who have left their jobs to enter the military service. In the face of spurred postwar production, however, it is reasonably safe to say that the metal-working industry will

TABLE OF DISCHARGE FORMS

Form No.	Color	Title	Rights to Reemployment Benefits of the Act
ARMY			
55	White	Honorable Discharge	Yes
56	Blue	Discharge	No
57	Yellow	Dishonorable Discharge	No
NAVY			
660	White	Honorable Discharge	Yes
661	White	Certificate of Discharge under Honorable Conditions (Naval or Naval Reserve)	Yes
662	Yellow	Dishonorable Discharge (Naval or Naval Reserve)	No
MARINES			
257	White	Honorable Discharge	Yes
257a	White	Honorable Discharge	Yes
258	White	Honorable Discharge	Yes
258a	White	Honorable Discharge	Yes
385a	White	Discharge	No
385c	White	By reason of desertion	No
385	Yellow	Bad Conduct Discharge	No
385b	Yellow	Dishonorable	No
COAST GUARD			
2510	White	Honorable	Yes
2510A	White	Under Honorable Conditions	Yes
2510B	Yellow	Dishonorable	No

NOTE: WACs, WAVEs, SPARs, and Women's Reserve Corps of the U. S. Marine Corps receive the same discharges as male personnel.

be in a position to absorb many more veterans than the law will require.

It is a foregone conclusion that industry will not be alone in presenting opportunities to the returning veterans. Many of these men will take advantage of educational and training courses opened to them by virtue of their war service. Others will be keenly interested in jobs outside the realm of factories.

Furthermore, veterans have had time for a lot of thinking about their futures while serving in the armed forces away from home. Many have decided to form their own businesses after their discharge. In this connection, the government has offered them real encouragement by enacting helpful legislation involving loans for such business ventures. The stabilizing influence of their service in the armed forces will be a stimulating factor in the success many veterans will realize in operating their own companies.

2,500,000 Have Valid Claims

Selective Service officials estimate that there will be about 2,500,000 veterans who will seek reinstatement in their old jobs and will have valid claims. Spread these out over industry, agriculture, wholesale and retail businesses and it can readily be seen that the so-called problem of the returning veteran is not as acute as some reports have made it appear.

In the matter of hiring veterans who have no prior claim to jobs, it would seem wise for small companies to follow some of the courses worked out by large companies. For example, the matter of interviewing veterans as prospective employees is an important consideration. They deserve and merit an opportunity to make their applications in an atmosphere that is inviting. Many companies have found that assignment of a former serviceman, who has already been reemployed, as an interviewer works out well. The bond formed by mutual war service often puts the veteran being interviewed at ease.

The Federal Government has taken many steps to facilitate such interviews. The "Report of Separation" given to every discharged soldier contains information about the veteran's education, civilian and military occupations, branch of the service, and type of discharge. A second form, bearing the symbol "WD-8GO-20" is a quick reference and includes a detailed record of the serviceman's military experience together with such information as his birthplace, education, marital status, dependents, extent of skill in a particular vocation, name and address of his last employer, scores on Army aptitude and classification tests, special training received in the Army, top leadership post attained and the nature of the discharge. This form is not confidential, but can only be obtained through the veteran's local Draft Board's reemployment committee.

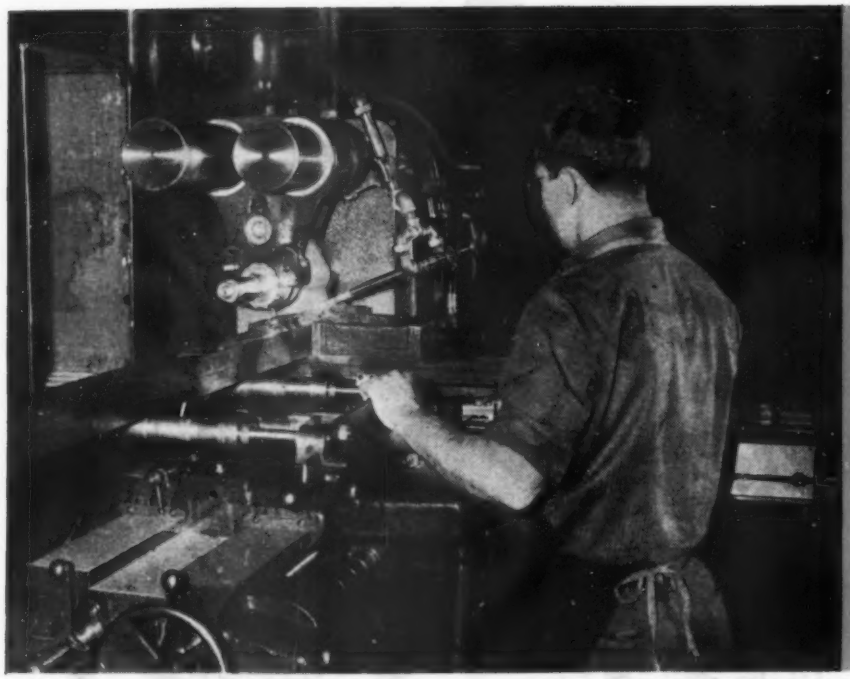
Few employers have forgotten the men who left their plants to preserve the American way of life. Letters to their men in service bear this out

Disabled veterans seeking jobs will require a little more specialized type of interview and evaluation of their abilities to do certain jobs available. One large company reports that more than 1,000 handicapped men and women have been employed since the start of the war. The classification "handicapped" includes only those with major defects, such as hands or feet missing, marked deformities, without the use of either or both eyes, without hearing or speech, and recovered from serious illnesses. Production, safety and absentee records of this group are above average, and serve to indicate that such employees make that much more effort to perform a good job despite their limitations.

Another large corporation considers national concern over the subject of "war nerves" as unfounded according to its experience record. Thorough study of the work habits, quantity and quality of work, absenteeism and accident rate of hundreds of so-called "nervous" employees reached the conclusion that their records were every bit as good as those employees without nervous conditions.

Hiring or rehiring of disabled veterans is somewhat similar to the return of regular employees who have been absent because of shop accidents. The same readjustment understanding on the part of plant superiors will apply to disabled veterans.

There will be isolated instances of employers shirking their obligations to returning veterans but reports coming from all sections of the nation indicate strongly that American industrialists, large and small, are just as anxious to welcome back the returning servicemen and women as the latter are to resume normal, peacetime living.



Excellent results have been obtained when cutting off steel bars at a surface speed of 500 ft. per min. with a 3/16-in. wide, 10-in. diameter, 12-tooth carbide tipped saw blade. Cutting dry results in a rough, wavy, out-of-square surface. By applying coolant under pressure to each side of the saw blade, and without changing any other conditions, smooth, square cuts are obtained. Chip load usually is about 0.003 to 0.004 in. per tooth

Coolant Improves Carbide Sawing Of Steel and Aluminum Alloy Bars

BY A. LEONHARDT, SUPERINTENDENT, GROVE REGULATOR COMPANY

Experimental set-ups indicate that high-speed sawing costs may be reduced so they compare favorably with burn-mill costs

EXPERIMENTAL and production sawing of steel and aluminum alloy bars and rods with carbide-tipped saw blades 3/16 in. wide has proved the desirability of using soluble oil coolant under pressure for such operations. When cutting without coolants, the chips seem to expand in the kerf and cause the saw to jam and weave from side to side. This results in a rough, wavy, out-of-square surface. With all other conditions the same, application of coolant under pressure has resulted in smooth, square cuts in steel and duralumin alloys.

Blocks of SAE-X1115 cold-rolled steel are now being sawed from long 5 × 2½ in. bars with 3/16-in. wide, 10-in. diameter 12-tooth carbide tipped saws with the two bars set one on top of the other. Good results have been obtained with a 10-deg. positive rake tooth form at 225 r.p.m. cutting speed, and with a feed of 12½ in. per min. The saw teeth are tipped with No. 883 Carboloy cemented carbide. This operation is performed in a Kearney & Trecker No. CSM plain knee-type milling machine powered with a 50 hp. electric motor.

When sawing X1115 cold-rolled steel, cutting speeds of 300 to 800 ft. per min., have been tried. A speed of about 500 ft. per min. gives the best results. In addition, chip loads per tooth have ranged from 0.001 to 0.006 in., with loads of 0.003 to 0.004 in. per tooth being found best. When face milling steel with carbide-tipped cutters on the same machine, a chip load of up to 0.010 in. per tooth is used.

As shown in the accompanying illustrations, the two 5 × 2½ in. steel bars are clamped one on top of the other in a No. 5 heavy-duty vise with 9-in. wide jaws. The vise jaws support the work close to the saw blades. On the other side of the saw blade, a special clamp block is bolted to the table of the milling machine so the cut-off ends of the two bars can be held rigidly throughout the cut. This prevents movement of these pieces and possible damage to the saw teeth. The clamp bar on this support block is springloaded to hold it off the work when the bars are being moved forward against the positive stop provided on this block. After the vise has been tightened, the operator uses a wrench to tighten the clamp bar tightly on the work.

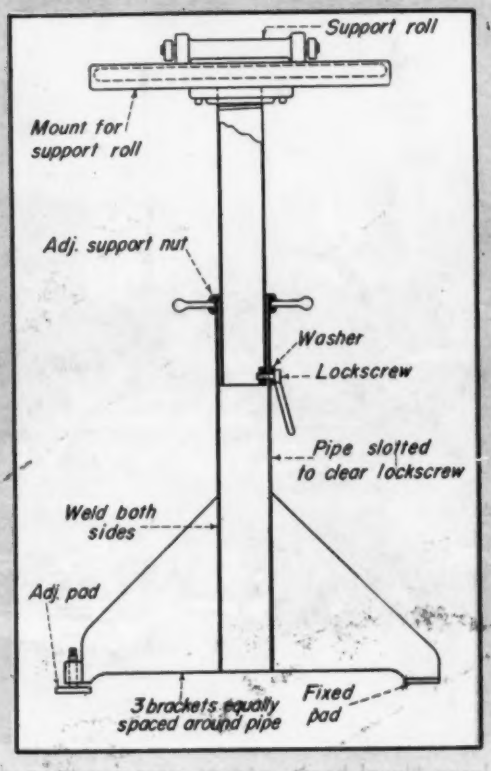
The long ends of the bars projecting from the other side of the vise are supported by a special roller rack clamped to the table of the milling machine, with the support angle beams clamped on each side of the vise base, and by an adjust-

able roller rest stand on the floor. These outboard supports are provided to minimize vibration in the bars throughout the sawing operation, as this vibration would be transmitted to the carbide-tipped saw teeth and reduce their useful life.

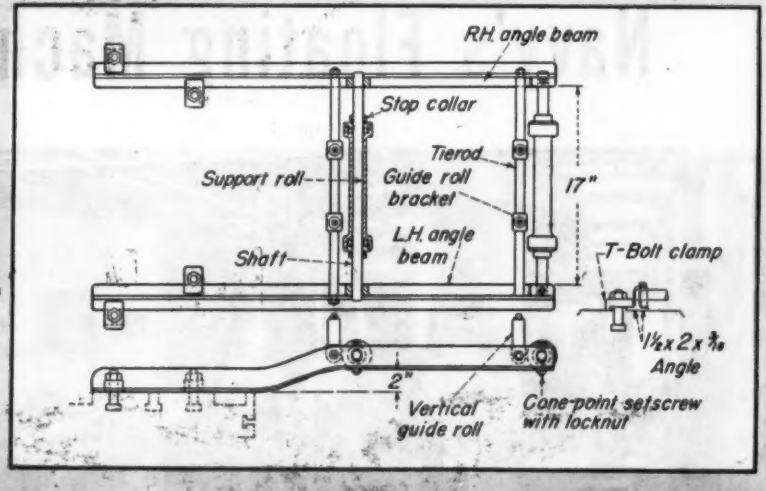
The saw blades not keyed to the 1¼-in. diameter arbor in the milling machine. Instead, it is free to rotate on a 1¾-in. diameter bronze bushing between its bore and the arbor. Thus, if the pressure of the cut causes the saw blade to slip between the 4½-in. diameter steel clamping flanges, the arbor will not be damaged. Two standard overarm bearings provide support to the arbor close on each side of the saw blade. All of these factors enable sawing across the 5 × 5 in. area on this steel cut-off job with an average of 35 cuts between cutter resharpenings.

For sawing 2¾-in. diameter duralumin rounds, two at a time, we have used a 20-tooth, 3/16 in. wide, 10-in. diameter carbide-tipped saw with teeth ground to a 10-deg. positive rake angle. When sawing at a speed of 1,015 r.p.m. and a feed of 60 in. per min., we have cut off between 10,000 and 15,000 pieces between grinds. This saw blade also is tipped with No. 883 Carboloy cemented carbide. When using a high-speed steel saw blade for this dural cut-off operation, best results were obtained with a 62-tooth saw ground with 15-deg. positive rake, and used at 500 ft. per min. surface speed and 60 in. per min. feed. We found that this saw did not have sufficient chip room, as the saw clogged and averaged only 2,000 to 3,000 pieces between grinds if the saw blades did not break from the heavy chip load.

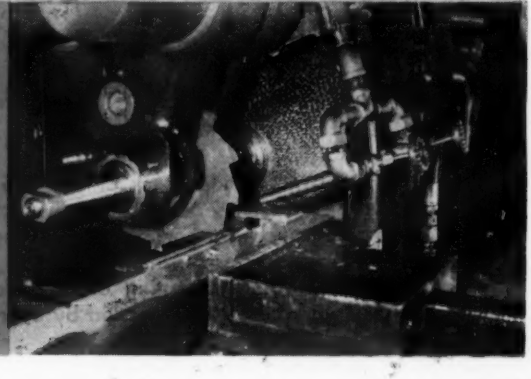
On the steel cut-off job described above, we save ½ in. of material on each piece by sawing instead of burning the pieces off with an oxy-acetylene torch and then milling the ends square. When burned and then milled, the cost per piece was about three times the cost of sawing (when the cost of the saw and its maintenance was not included in sawing cost) and more time was expended. The cost of sawing, including the cost of the saw and its maintenance, is about 140 percent of the burn-and-mill cost. Experimental work now in progress may reduce this sawing cost to a point where it will compare favorably with the burn-and-mill cost. The operation is being continued on the milling machine set-up described as part of our experimental work.



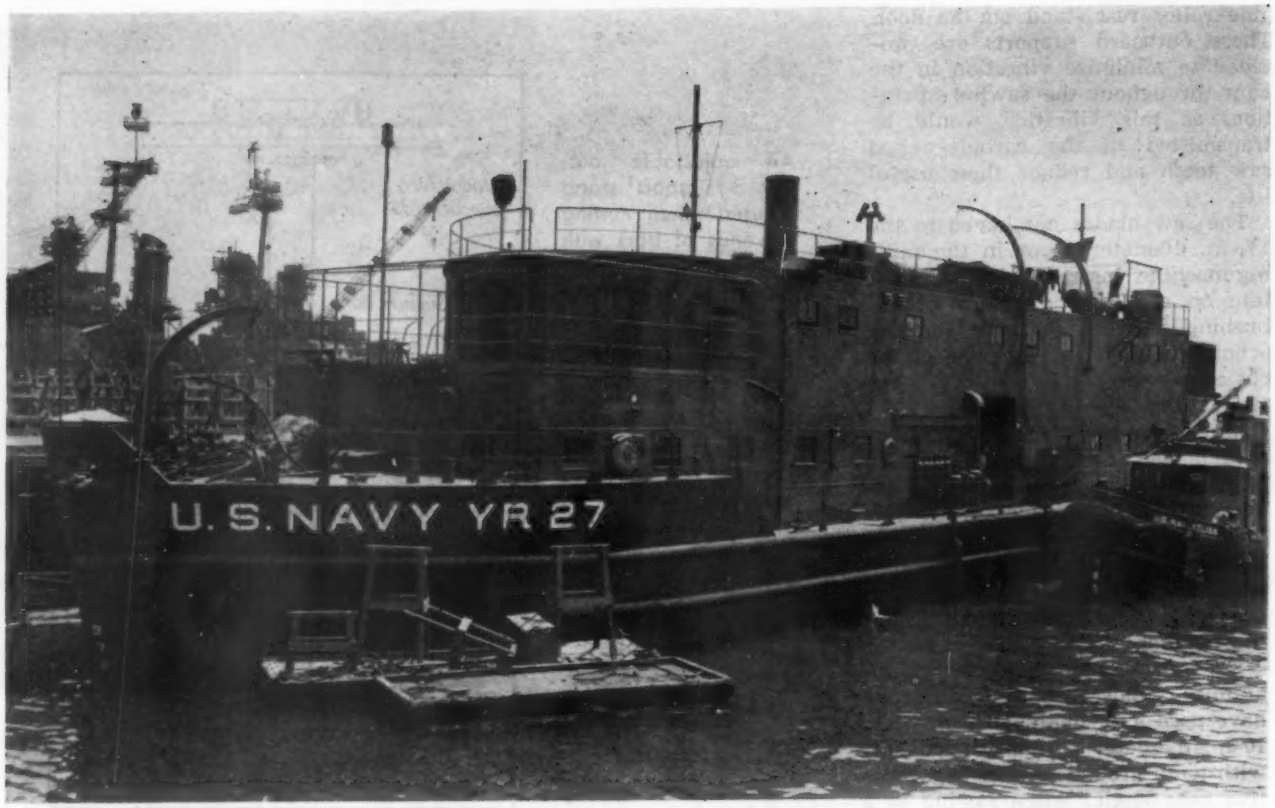
An adjustable outboard support stand is used when cutting off ends of bars with a carbide-tipped saw blade at speeds of 500 ft. per min. or more. This support can be leveled on an uneven floor and is adjustable for height. The mount permits the support roll to move sidewise when the work is fed past the rotating cutter



This relatively inexpensive support rack helps reduce vibration in overhanging ends of bars being cut off on a milling machine. The vertical and horizontal guide and support rolls minimize the effort required to shift the bars into cutting position

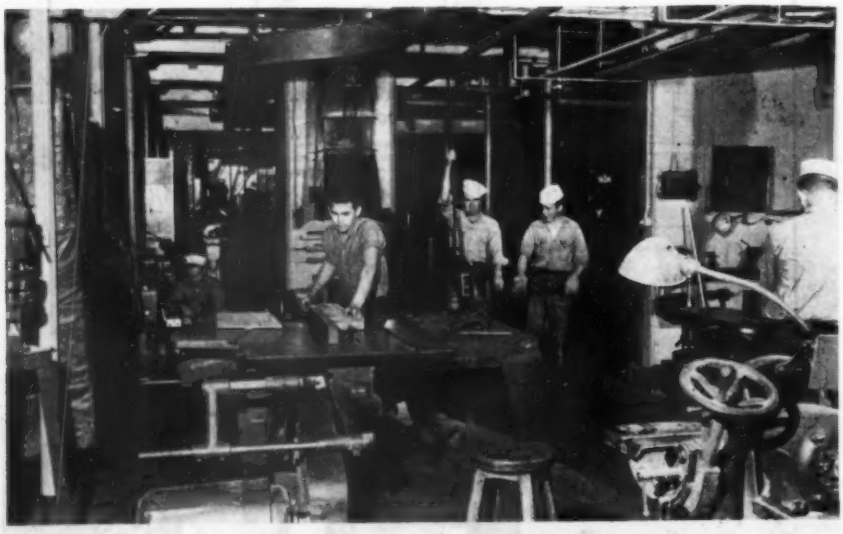


Adequate support of the work and the saw arbor is essential for high-speed carbide sawing operations. Two nozzles direct coolant under pressure at the point where the saw tooth enters the work



At large Naval bases, and at more remote and isolated locations, within home waters and overseas, the U.S. Navy uses repair barges, complete "floating machine shops," that are moored to a pier or alongside the larger ship while repair work is being done. Although they are without propelling machinery of their own, being towed from place to place as necessary, these barges make overseas trips and, therefore, must be constructed so they are seaworthy

Navy's Floating Machine Shops

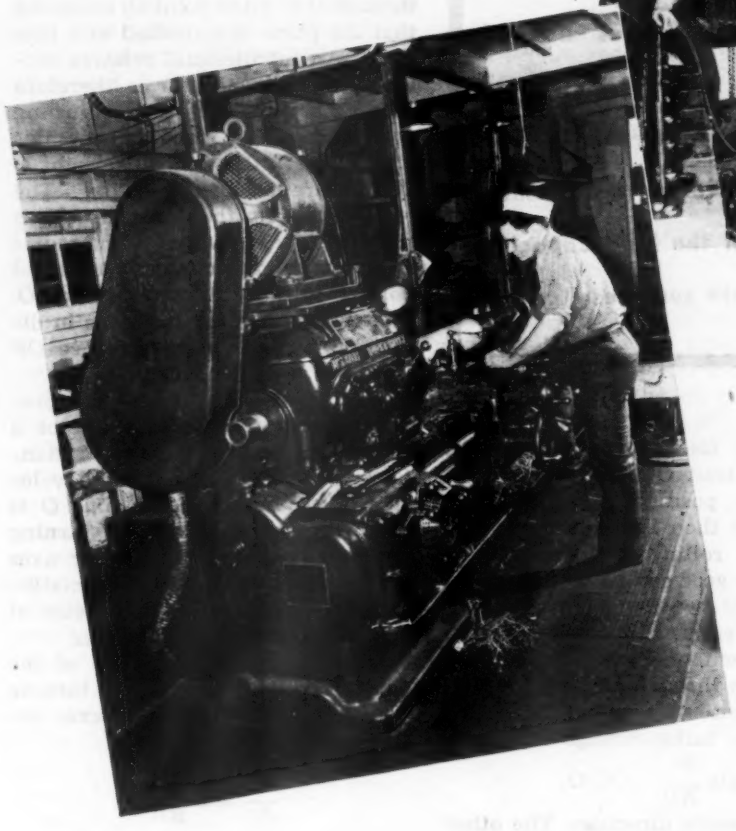


Looking aft on the main (shop) deck of the USS YR27, one of the number of Navy repair barges now in service. A small blacksmith shop is directly behind the saw in the foreground; farther aft is a welding shop, equipped for gas and electric arc welding. The sternmost section of the main deck is a loading stage, uncovered, and the adjacent section of the deckhouse structure is movable, permitting heavy workpieces to be moved by overhead conveyor to any portion of the shop

STURDY BARGES transformed into modern machine shops represent the U.S. Navy's answer to rapid, efficient repair of damaged battle equipment on the fighting seafronts of the world. Without propelling machinery of their own, the vessels are towed to ports and ships requiring their services. Their seaworthiness permits their travel to Naval bases in the Atlantic, Pacific, Mediterranean and, in fact, to most every port.

Known as "floating machine shops," each vessel has a steel hull about 150 ft. long. There are three decks: the upper one serves as living quarters for the crew of some 45 men; the second or main deck carries the shop, and the lower deck houses the power plant and storeroom. The barges carry a wide assortment of tools and materials to fit virtually any repair demands.

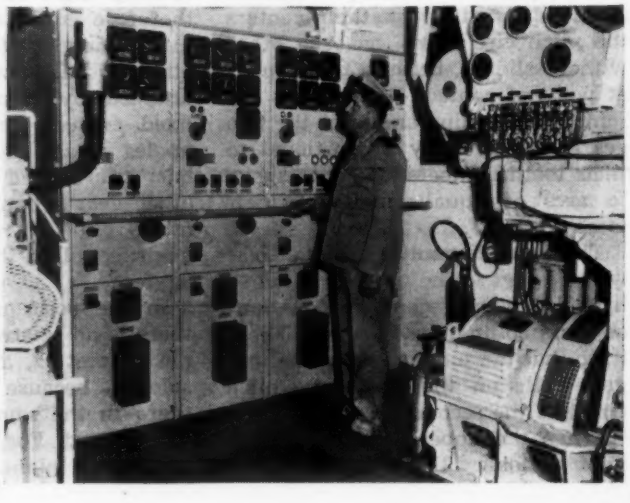
Looking forward on the main deck of the USS YR27. Workbenches extend along the outboard sides of the deckhouse. The smaller engine lathe in the background is one of the well-balanced group of general-purpose tools with which these vessels are equipped. Others such as milling machines, shaper, radial drills, drill presses, standard grinders, and all bench and hand tools are needed to enable the crew to handle the many, varied repair problems they meet



Largest of the general-purpose machine tools aboard the USS YR27 is this 18 in. engine lathe. When these barges go to sea (under tow) all movable elements of the tools must be lashed fast to withstand the motion of the ship. Work is done only within sheltered waters. Machinist's Mate 3/c James B. Lawson, from Cleveland, Ohio, is shown here at work aboard his vessel, at the U.S. Naval Drydocks, Terminal Island, California

A well-equipped storeroom is needed, if a repair barge is to do the complete and efficient job for which she was designed. Steel, bar stock, tubular stock, sheet and plate, and numerous shapes of non-ferrous metals are available in the compact and complete "below-deck" storeroom. Everything movable must be lashed against movement before one of these repair barges goes to sea

Electric power for the operation of tools, welders, hoists, and for services to the shop and the crew, a power plant, diesel-driven generators, is installed on repair barges, one 100 kw. unit, two units of 60 kw. each, and equipment for steam heating, ventilating, refrigeration and firefighting. Shown here is Warrant Machinist F. W. Basinger, in charge of the USS YR43, at the power panel, in the engine room of his vessel. Main generator is at right



Gear Tooth Curvature Treated Simply

BY ERNEST WILDHABER, GLEASON WORKS

A continuous use of tooth normal facilitates broader determination of the curvature data which control the load capacity of tooth surfaces

IN A CONVENTIONAL treatment of spur gears the tooth normal is introduced, and then abruptly discarded. Here, in considering the various curvatures that control the load capacity of the tooth surface the tooth normal will be the element of most importance. In trying to determine the shape of a mating profile the normal, at a point of the given tooth profile, is moved along with the profile point to furnish the normal at the mating profile point. Normals are then moved around to determine profile curvature, curvature centers and relative curvature.

A pair of spur gears, whose tooth profiles mesh in operation, are shown in Fig. 1, taken at right angles to the parallel axes C^1 and C^{11}. Thus a pair of mating profiles contact at O in the position shown. On the opposite side of the teeth two pairs of profiles are in contact at points P and Q. A small amount of backlash is provided so that actual contact exists on but one side at a time.

As the two gears and their plane sections turn uniformly on their centers C^1 and C^{11}, they move in the same direction at any point on their line of centers, C^1C^{11} and, at point O in this line, they move at the same speed. Point O cuts the center distance into two portions, $C^1O = R^1$ and $C^{11}O = R^{11}$, which are proportional to the numbers of teeth of the two gears, N^1 and N^{11}.

The circles K^1 and K^{11}, which are drawn about the centers of the gears, are called pitch circles and their contact point O is the pitch point. As the gears turn on their centers the pitch circles roll on each other without sliding, because their speed at point of contact O is always the same. The turning angles of the two gears are inversely proportional to their tooth numbers, and correspond to arcs of equal length of their pitch circles.

The relative motion of one gear with respect to the other is obtained by holding the second gear stationary and rolling the first gear about it, so that the pitch circle of the first gear rolls on the stationary pitch circle of the second.

When the upper gear in Fig 1 is kept stationary the lower gear rolls around it. Its center C^{11} describes a circle about C^1 and at one time reaches a position C_2. The pitch circles are then in contact at point O_2. This rolling motion about a stationary gear can be considered as made up of two component motions. One of these is the turning motion on fixed centers, whereby the upper gear turns through an angle OC^1O_2 in clockwise direction while the lower gear turns through a proportional angle $\frac{N^1}{N^{11}}$ (OC^1O_2) in the opposite direction. The other component motion is a motion of the whole unit about center C^1 through angle OC^1O_2 in counterclockwise direction, so that the upper gear is brought back to its initial position. In this second component motion the lower gear is turned through angle OC^1O_2. The total turning angle of the lower gear is therefore equal to the sum of the turning angles of the two gears. In other words the relative position attained by turning the gears on fixed centers through proportional angles is also attained by holding one gear fixed and rolling the other gear around it, whereby this other gear is turned through an angle equal to the sum of the two angles.

In the position shown in Fig. 1 there is no relative linear motion at pitch point O, at the instant considered, because both gears move there in the same direction at the same speed. For an infinitely brief instant the plane of the lower gear can only move as if a pin were stuck through it at pitch point O, assuming that the plane is embodied as a thin sheet. An infinitesimal relative motion of the lower gear is therefore nothing but an infinitesimal turning motion about an instantaneous axis which passes through pitch point O and is parallel to the gear axes. The same is true for the upper gear. This motion is perpendicular to the radius OP, drawn from any considered point P to the instantaneous axis O. The relative motion increases in direct proportion to the distance OP from the instantaneous axis.

Relative velocity is likewise proportional to the distance OP of a considered point P from the instantaneous axis O. The turning velocity about instantaneous axis O is equal to the sum of the turning velocities about the two gear axes C^1 and C^{11}, because the relative turning angle is equal to the sum of the individual turning angles.

If v denotes the velocity of the gears at pitch point O, the turning velocities about the gear axes are then

$$\frac{v}{R^1} \text{ and } \frac{v}{R^{11}}$$

and about instantaneous axis O it is

$$\left(\frac{v}{R^1} + \frac{v}{R^{11}}\right)$$

The relative velocity v_s, which is also the sliding velocity at any point P, is perpendicular to radius OP and amounts to

$$(1)\quad v_s = OP \cdot v \cdot \left(\frac{1}{R^1} + \frac{1}{R^{11}}\right)$$

Inasmuch as relative motion at any one instant is a turning motion about the instantaneous axis O, contacting tooth profiles are bound to extend in a direction to permit this relative motion. In other words the profile tangent at any point of contact P is perpendicular to radius PO which connects point P with instantaneous axis O.

A straight line such as PO, which is perpendicular to the profile at point P, will be called the profile normal at P. It is then evident that the common profile normal at any

point of contact passes through the instantaneous axis.

This kinematic requirement enables the tooth profile of one gear to be determined, when the profile of the other gear is given. The profile normal at any point of the given tooth profile is drawn. The normal and its profile point are then turned about the gear axis of the profile until the normal passes through the given instantaneous axis. The profile point is then in its position of contact with the mating gear, and both the point and the normal belong to both gears. They are now turned back about the axis of the mating gear through a corresponding angle, an angle whose length of arc on the pitch circle is the same as the length of arc of the first named turning angle on the pitch circle of the first named gear, and are then a point and a normal of the mating tooth profile. Other points and profile normals are similarly determined, and the profile of the mating gear is clearly defined.

The positions of the various points of gear contact constitute another line, which is called the line of action. The gears shown in Fig. 1 have a straight line of action, coinciding with the tooth normal at all points of contact. It is inclined to the pitch circles at an angle called the pressure angle ϕ. The profiles are involutes.

With any given tooth profiles of one gear the tooth profiles of any mating gear may be determined as described. For each of the gears centered at C^1 and C^{11} various other mating gears, whose centers lie on line C^1C^{11} outside of C^1 and C^{11}, and whose pitch circles all contact with pitch circles K^1 or K^{11} at point O, may be determined. All such pairs will have the same lines of action.

One of the mating members may be a rack, having a straight pitch line which passes through pitch point O. With a straight line of action, as shown in Fig. 1, the tooth profile of the rack is bound to be a straight line perpendicular to the line of action. If the tooth sides of the rack are imagined to be infinitely thin, then the rack can mesh simultaneously with the two gears centered at C^1 and C^{11}, indicated in Fig. 2. The pitch line K_r, of the rack rolls on the gear pitch circles K^1 and K^{11}, contacting them at pitch point O. The rack profile separates the gears, and contacts with both gears at the same points O, P and Q at which the gears contact with each other.

It is also possible to start with the rack profile and determine the profiles of the two gears centered at C^1 and C^{11} so that they mesh properly with the rack. They will then mesh properly with each other.

The tangent at a given point of a a tooth profile, or of any curve, describes the general direction of the curve in the immediate vicinity of the considered point. The curve itself recedes from its tangent on both sides of the point of tangency. This rate of recession varies with different curves, and can be compared with the rate at which a circle recedes from its tangent. A circle of large radius recedes slowly and a circle of small radius recedes rapidly.

Consider a point of the curve, O^1 in Fig. 5, which is very close to the point of contact O with said tangent. Its distance OO^1 from this point of contact shall be denoted by dx.

The normal at the new point O^1, which is the perpendicular to the curve, includes an extremely small angle $d\tau_r$ with the normal at the first point O, so that the two normals intersect at a distance ρ from the first point O. ρ is called the radius of curvature when dx is infinitely small.

On a circle the length of arc is the product of the radius and the included angle, in radians. What is true for the radius of a circle is also true for the curvature radius ρ when distance dx is infinitely small.

$dx = \rho \cdot d\tau$; $d\tau$ in radian measure;

$$\rho = \frac{dx}{d\tau}$$

The curvature is the reciprocal of the radius of curvature, $\frac{1}{\rho}$ and is the rate of change of the angle $\frac{d\tau}{dx}$ at point O.

The radii of curvature of the involute profiles, at pitch point O, will now be determined. Fig. 3 shows a very small portion of the rack profile around pitch point O, greatly magnified. Point O^1 of the straight rack profile gets into contact with the gears centered at C^1 and C^{11} in position O^{11}, when its normal passes through pitch point O and coincides with the line of action. Point O^{11}, together with its normal OO^{11}, is then turned back about gear center C^1 through an angle corresponding to the rack displacement O^1O^{11}, and to a length of arc O^1O^{11} on pitch circle K^1. This angle amounts to $\frac{O^1O^{11}}{R^1}$ in radians, R^1 being the radius of pitch circle K^1. Thus point O^{11} practically returns to O^1, and exactly so when distance OO^1 is infinitely small. The gear tooth profile then appears straight in the magnification used.

After turning, the normal OO^{11} has a position O^1M^1 and is inclined to

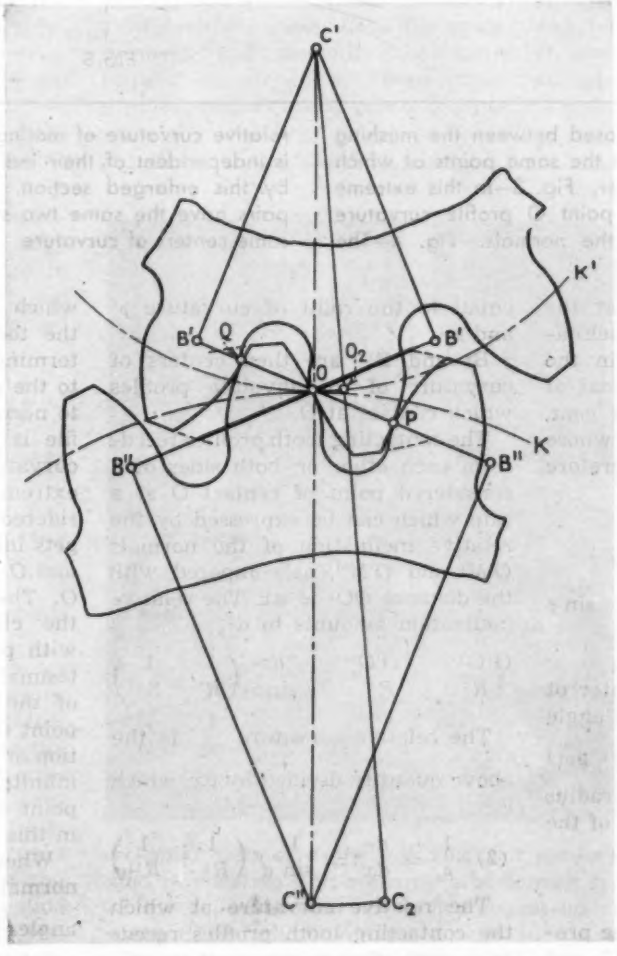


Fig. 1—Profile sliding at any point P in this pair of spur gears is proportional to distance OP and to the sum of the angular velocities of the two gears

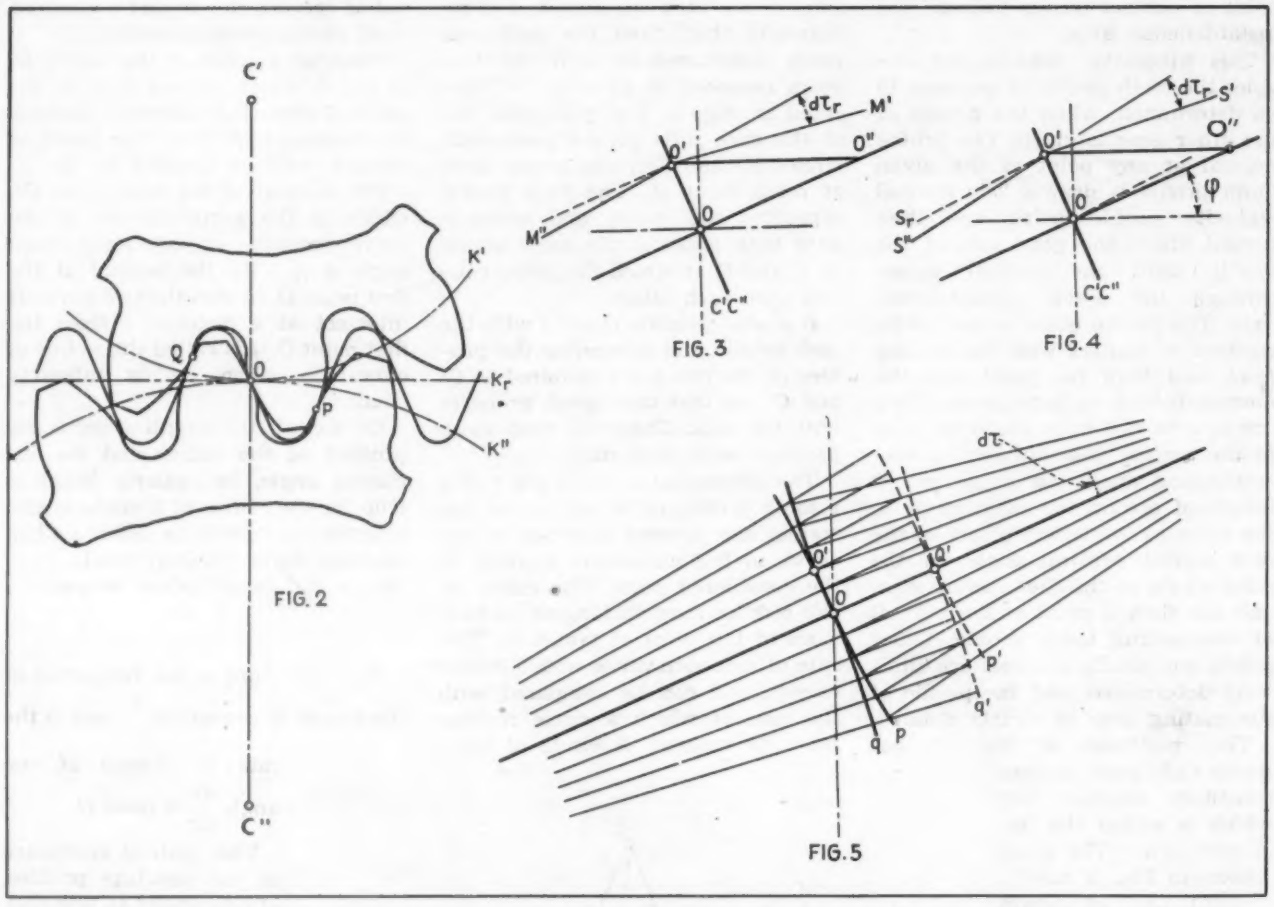


Fig. 2—A basic rack, interposed between the meshing gears, contacts the gears at the same points at which the gears contact each other. Fig. 3—In this extreme enlargement around pitch point O profile curvature is determined by moving the normals. Fig. 4—The relative curvature of mating profiles, at pitch point O, is independent of their individual curvatures as shown by this enlarged section. Fig. 5—Equidistant profile pairs have the same two systems of normals and the same centers of curvature

its previous position OO^{11} at the aforesaid turning angle. Its inclination is greatly exaggerated in the drawing. O^1M^1 is now a normal of the tooth profile of the upper gear, which is centered at C^1, and whose curvature radius ρ^1 therefore amounts to

$$\rho^1 = OO^1 \div \frac{O^1O^{11}}{R^1} = R^1 \cdot \frac{OO^1}{O^1O^{11}};$$

$$\frac{OO^1}{O^1O^{11}} = \sin\phi$$

$$\rho^1 = R^1 \sin\phi$$

When turned about the center of the lower gear C^{11} through an angle $\frac{O^1O^{11}}{R^{11}}$ the profile normal OO^{11} gets into a position O^1M^{11}, and the radius of curvature ρ^{11} of the profile of the other gear amounts to

$$\rho^{11} = R^{11} \sin\phi$$

B^1 and B^{11}, in Fig. 1, are the projections of the gear centers C^1 and C^{11} to the two lines of action. Their distances from pitch point O are $OB^1 = R^1 \sin\phi$ and $OB^{11} = R^{11} \sin\phi$, equal to the radii of curvature ρ^1 and ρ^{11}.

B^1 and B^{11} are then centers of curvature of the involute profiles which contact at O.

The contacting tooth profiles recede from each other on both sides of a considered point of contact O at a rate which can be expressed by the relative inclination of the normals O^1M^1 and O^1M^{11}, as compared with the distance $OO^1 = dx$. The relative inclination amounts to $d\tau_r =$

$$\frac{O^1O^{11}}{R^1} + \frac{O^1O^{11}}{R^{11}} = \frac{dx}{\sin\phi}\left(\frac{1}{R^1} + \frac{1}{R^{11}}\right)$$

The relative curvature $\frac{1}{\rho_r}$ is the above quantity divided by dx, which is

$$(2)\quad \frac{1}{\rho_r} = \frac{d\tau_r}{dx} = \frac{1}{\sin\phi}\left(\frac{1}{R^1} + \frac{1}{R^{11}}\right)$$

The relative curvature at which the contacting tooth profiles recede from each other is important in estimating surface stresses.

The relative curvature at pitch point O of other forms of teeth, which have the same inclination of the tooth normal can now be determined. In Fig. 4 the normal O^1S_r to the rack profile is shown inclined to normal OO^{11}. A curved rack profile is used here, even though the curvature does not show up on the extremely small profile portion considered. Point O^1 of the rack profile gets into gear contact when its normal O^1S_r passes through pitch point O. The smaller the distance OO^1 is the closer this position coincides with position O^{11}. With an infinitesimal distance OO^1 the separation of the point of gear contact from point O^{11} is an infinitely small fraction of distance O^1O^{11}, which itself is infinitely small. In other words the point of contact coincides with O^{11} in this limit case.

When this point of contact and its normal are turned back through an angle $\frac{O^1O^{11}}{R^1}$, about axis C^1, the point of contact returns to O^1 in the limit case and the normal is then at O^1S^1. When turned back about axis O^{11}, the point of contact also re-

turns to O^1 and the normal assumes a position O^1S^{11}. The two profile normals O^1S^1 and O^1S^{11}, at a distance OO^1 from O are therefore inclined to each other at an angle equal to the sum of the turning angles, which is the same angle $d\tau_r$ as obtained for involute teeth. The relative curvature $\frac{1}{\rho_r}$ of the contacting tooth profiles is therefore the same, as given by formula (2). Thus the relative curvature of the tooth profiles at pitch point O is independent of the individual profile curvatures.

It is also seen that ϕ, the inclination of the line of action at pitch point O, is independent of the curvature of the profiles and equal to the inclination of the profile normal to the direction of the periphery. With curved rack profiles the normal OO^{11} is a tangent to the line of action, which is also curved.

The load capacity of the tooth surfaces at a given maximum surface stress is proportional to the radius ρ_r of the relative curvature. The load capacity of the tooth surfaces therefore increases with increasing pressure angle ϕ. At the same time, the duration of contact is reduced.

For an extremely small given radial or depthwise travel Δr (equal to $OO^1 \cos \phi$ in Fig. 4) of the point of contact, the corresponding length of the line of action is $\frac{\Delta r}{\sin \phi}$, $(= OO^{11})$. The amount of energy which can be safely transmitted in this element of mesh is proportional to the product of load capacity and travel, that is to

$$\rho_r \frac{\Delta r}{\sin \phi} = \Delta r \div \left(\frac{1}{R^1} + \frac{1}{R^{11}}\right)$$

This quantity is entirely independent of the pressure angle ϕ. In the immediate vicinity of the pitch point O the loss of surface capacity at reduced pressure angles is made up by the increase in duration of contact. Conditions change at points removed from the pitch circles.

At the point where the line of action comes closest to the center of a gear, the profile point of this gear tends to stay in contact as the gear turns. This means that the profile tangent at this point becomes indefinite. Many straight lines of different directions can then be considered profile tangents, so that the profile has a zero curvature radius there and is useless. B^1 in Fig. 1 is such a point with respect to the gear centered at C^1. With such teeth point B^1 is well outside of the tooth action. With smaller pressure angles, however, it would be closer to pitch point O, and within reach of the mating teeth. To avoid such conditions the pressure angle ϕ is kept away from zero, by an angle such as 20-deg. which is a standard pressure angle in wide use.

Formula (2) gives the relative curvature of the tooth profiles at pitch point O. The individual curvatures $\frac{1}{\rho_r}$ and $\frac{1}{\rho^{11}}$ add up to the relative curvature $\frac{1}{\rho_r}$. Thus (2a)

$$\frac{1}{\rho_r} = \frac{1}{\rho^1} + \frac{1}{\rho^{11}} = \frac{1}{\sin \phi}\left(\frac{1}{R^1} + \frac{1}{R^{11}}\right)$$

When one of the curvature radii ρ^1 and ρ^{11} is assumed, the other can be determined with this formula.

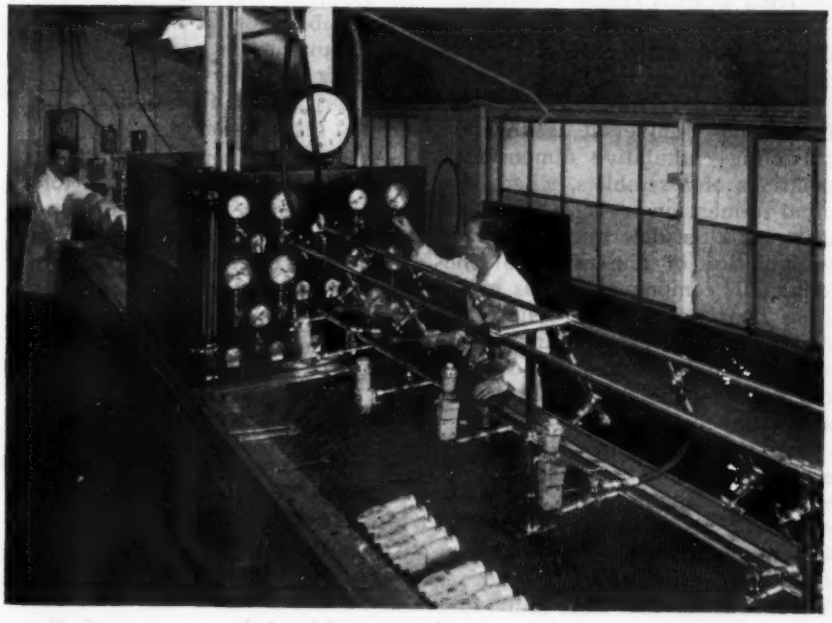
Curvature centers, such as B^1, B^{11} in Fig. 1, are located by spacing off the curvature radii ρ^1 and ρ^{11} from pitch point O on the tooth normal.

The kinematic requirements are controlled by the normals alone, some of which are shown in Fig. 5. Therefore not only the profiles p and q, which contact at pitch point O, fulfill the kinematic requirements, but also any other tooth profiles such as p^1 and q^1, which have the same normals, and therefore the same centers of curvature. These other profiles contact at a point Q^1, located anywhere on the common normal which passes through pitch point O.

Thus, a point of contact may be assumed on a normal which passes through pitch point O, and the center of curvature of one of the contacting profiles may also be assumed on this normal. The center of curvature of the mating profile is then determined as if the profiles would pass through and contact at pitch point O. ρ^1 and ρ^{11} of formula (2a) remain the distances of the curvature centers from pitch point O, but are no longer the curvature radii.

Profiles which have the same system of normals run at a constant distance from one another and are called equidistant profiles. The centers of curvature of any two contacting profiles may be determined for the equidistant profiles which contact at the pitch point O.

The involute profiles shown in Fig. 1 are equidistant profiles, inasmuch as they are capable of contacting with parallel straight rack profiles. B^1 and B^{11} are also the centers of curvature for profiles contacting at any point P outside of pitch point O, and PB^1, PB^{11} are the radii of curvature of the contacting profiles at point P.



Scientific tests of every hydraulic unit produced by the Interstate Aircraft and Engineering Corporation are performed in this laboratory. One section of the equipment can test with pressures up to 3,000 p.s.i., supplied by a motor-driven piston-type pump with 10 g.p.m. output. The other section tests units up to 1,500 p.s.i., supplied by a motor-driven vane-type pump with 10 g.p.m. output. A hand pump permits pressures up to 10,000 p.s.i. The laboratory's first filter reduces foreign particles down to 10 microns, and the second reduces them to 2½ microns. The tester incorporates cooling and heating systems, automatically maintaining the oil at specified temperature

Statistical Control of Assemblies Eliminates Selective Fitting

BY BENJAMIN EPSTEIN, HEADQUARTERS QUALITY CONTROL WESTINGHOUSE ELECTRIC CORPORATION

QUALITY CONTROL of production by statistical methods has been found to facilitate operations in the production of large quantities of single unit components. Statistical controls have generally been applied only to production of screw machine and similar parts where immediate corrections of excessive deviations from standards are possible. The method of control is not restricted to such simple conditions.

It is possible to extend the advantages of statistical control to more complex situations involving a number of varying factors. Of these, one of the most universal is that of controlling cumulative dimensional deviations of assemblies, where the actual dimension over a span of components is determined by the accumulation of dimensions of the individual components. This definition does not include cylindrical or other internal-external fits unless the specified tolerances are considered only as line fits in the direction of dimensional accumulation.

In illustration of methods of determining cumulative dimensional tolerances suitable for statistical control of assemblies, a dimension denoted by X is built up of component dimension of x_1, x_2 and x_3. The dimensions and their individual tolerances are given as follows:

$x_1 = 0.063 \pm 0.004$

$x_2 = 0.250 \pm 0.005$

$x_3 = 0.500 \pm 0.005$

Usual practice would provide for a nominal dimension of 0.813 in. and a tolerance of ± 0.014 in. This tolerance is arrived at by providing for inclusion, within the tolerance, of three components having the minimum permissible deviation and three having the maximum permissible deviation. This provision is made without regard for the element of probability controlling such occurences.

It is improbable that such conditions, whereby all components of an assembly were of the minimum permissible deviation, or all were of the maximum permissible deviation, can exist when all components are picked from lots having a normal distribution of tolerances.

As the number of components with a normal distribution of tolerances increases, the actual dimensions of the assembly will deviate from the nominal in a proportion approximately inverse to the increase in the number of components.

This permits specification of assembly tolerances to be less than the sum of tolerances of the individual components. The method of determining the permissible deviation of a cumulative dimension composed of component dimensions having known limits of variation and a normal distribution of deviations is based on the theorem:

If a variable x_1 possesses an average M_1 and deviation σ_1 and if a variable x_2 possesses an average M_2 and deviation σ_2, and if a variable x_n possesses an average M_n and deviation σ_n, then the variable X defined by:

$X = x_1 + x_2 + \ldots\ldots x_n$

possesses an average M of:

$M = M_1 + M_2 + \ldots\ldots M_n$

and the deviation:

$\sigma = \sigma_1^2 + \sigma_2 + \ldots\ldots \sigma_n.$

Thus, the deviation of X is calculated by computing the square root of the sum of the squares of the permissible deviations of the components.

$\pm\sqrt{(.004)^2 + (.005)^2 + (.005)^2} =$

$\pm\sqrt{.000016 + .000025 + .000025} =$

$\pm\sqrt{.000066} =$

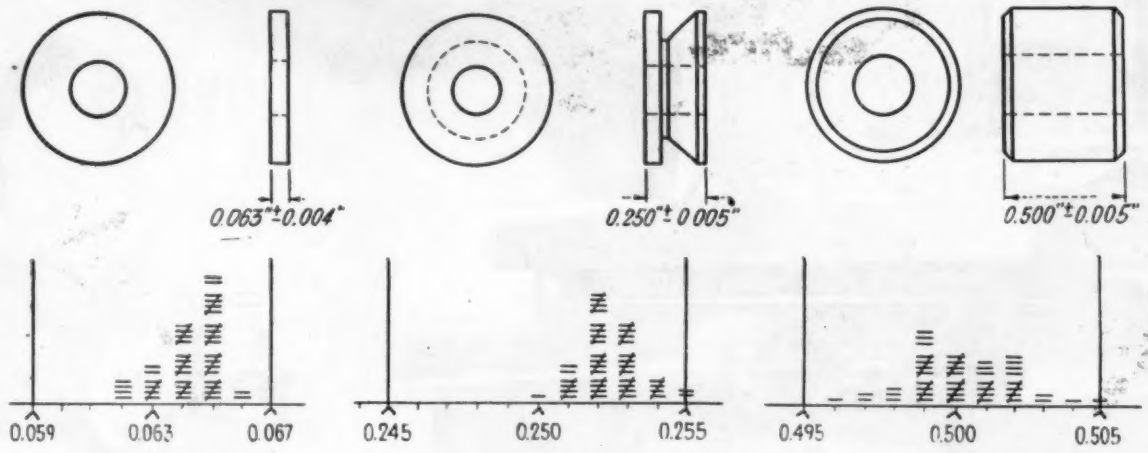
$\pm$ 0.00813 in.

As a practical means of verifying the predicted results of this rule, a test was conducted using production parts under actual operating conditions. Three components of an assembly were chosen for the test. Samples of each of the items were drawn at random from storage lots and the average mean and deviation computed for each size lot.

The test then consisted of:

(1) Stacking fifty x_2 samples on fifty x_3 samples, at random, to obtain fifty cumulative dimensions

Manufacturing engineers often face the problem of relating assembly tolerances and those established for component parts. This article presents a method that permits random assembly



Height in Inches

x_1

Specification $= 0.063 \pm 0.004$

Sample $\bar{x}_1 = 0.0642$

Sample $\sigma_1 = 0.0010$

$\bar{x}_1 \pm 3\sigma_1 = \begin{cases} 0.0672 \\ 0.0612 \end{cases}$

Height in Inches

x_2

Specification $= 0.250 \pm 0.005$

Sample $\bar{x}_2 = 0.2524$

Sample $\sigma_2 = 0.0010$

$\bar{x}_2 \pm 3\sigma_2 = \begin{cases} 0.2554 \\ 0.2494 \end{cases}$

Height in Inches

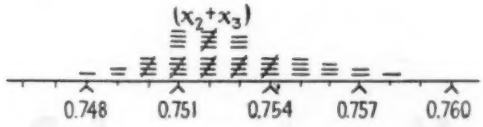
x_3

Specification $= 0.500 \pm 0.005$

Sample $\bar{x}_3 = 0.5003$

Sample $\sigma_3 = 0.0018$

$\bar{x}_3 \pm 3\sigma_3 = \begin{cases} 0.5057 \\ 0.4949 \end{cases}$



Predicted

$\bar{x}_2 + \bar{x}_3 = 0.7527$

$\sigma = \sqrt{\sigma_2^2 + \sigma} = \sqrt{(.0010^2 + (.0018)^2} = 0.0021$

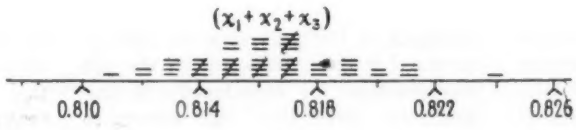
$\bar{x} \pm 3\sigma = \begin{cases} 0.7590 \\ 0.7464 \end{cases}$

Actual

$\bar{x}_2 + \bar{x}_3 = 0.7526$

$\sigma = 0.0022$

$\bar{x} \pm 3\sigma = \begin{cases} 0.7592 \\ 0.7460 \end{cases}$



Predicted

$\bar{x}_1 + \bar{x}_2 + \bar{x}_3 =$

$\sigma = \sqrt{\sigma_1^2 + \sigma_2^2 + \sigma_3^2} = \sqrt{(.0010)^2 + (.0010)^2 + (.0018)^2} = 0.0023$

$\bar{x} \pm 3\sigma = \begin{cases} 0.8238 \\ 0.8100 \end{cases}$

Actual

$\bar{x}_1 + \bar{x}_2 + \bar{x}_3 = 0.8163$

$\sigma = 0.0026$

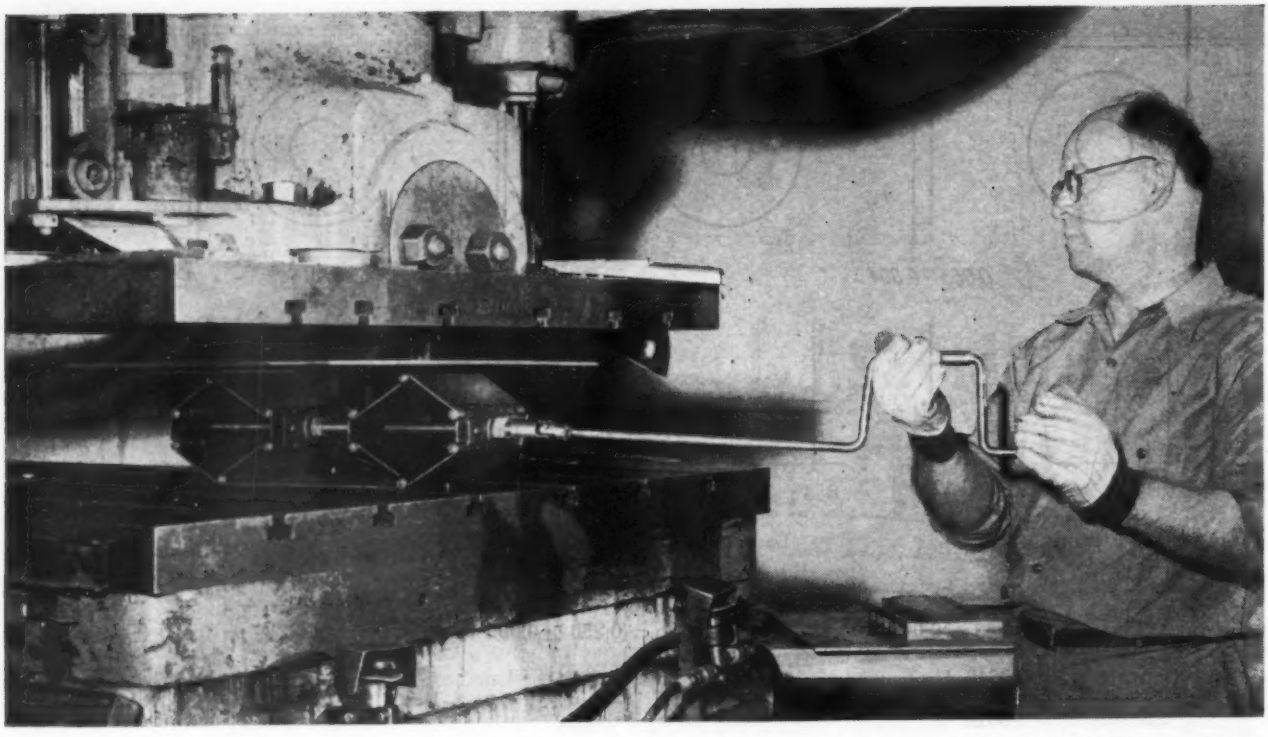
$\bar{x} \pm 3\sigma = \begin{cases} 0.8241 \\ 0.8085 \end{cases}$

of $x_1 + x_2$. The average mean and deviation were recorded and compared with the predicted mean and deviation.

(2) Stacking fifty x_1, x_2 and x_3 on each other to obtain the mean and deviation for comparison with those predicted for this assembly.

The distributions of the assemblies were normal and within the limits predicted, although the distribution of component x_3 was the only one of the three components having a normal aspect.

With this method of controlling deviations of assembled cumulative dimensions, quality control of assemblies is reduced to a matter of controlling average deviations of production lots of components, rather than controlling the individual component by selective assembly and fitting. When a lot having a deviation greater than that permissible is produced, it may be balanced by selection, or deliberate production, of a mating component lot having



Crank operation of the die jack suggested by Leroy A. Kamrath will lift a pancake-type die unit a maximum of 6 in. Closed height of the jack is 4 in. Maximum height is 10 in. Because it is screw operated, the jack remains fixed at any height setting

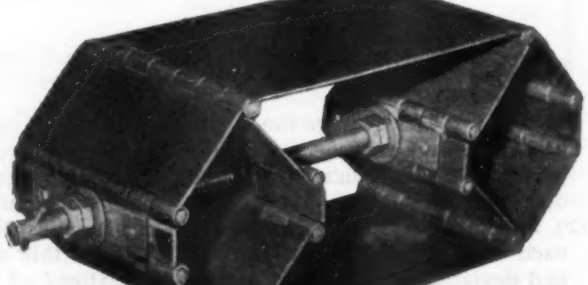
Jack Eases Mounting of Pancake Dies

BY G. F. GERHAUSER, CHIEF TOOL ENGINEER, CONSOLIDATED VULTEE AIRCRAFT CORPORATION

MOUNTING of pancake-type punches and dies in large punch presses has been simplified at the San Diego plant of the Consolidated Vultee Aircraft Corporation through the development of a hinge-type lifting jack suggested by Leroy A. Kamrath, a punch press operator. For a long time the operators of these presses had difficulty mounting the upper units of these die tools because the die piece had to be lifted laboriously into position with lengths of 2 × 4 timbers, and held in position by one operator while another bolted the die plate to the face of the ram. This took approximately 10 min. per set-up, using two men.

Now, one man can make a die set-up in less time than it used to take the two men and much less effort need be expended. With the new jack, the die unit is rested on the top plate of the jack and the jack is operated with a crank to lift the die into position for attachment to the ram face. This jack also serves to lower the die after it has been detached from the ram head at the end of a production run.

The screw-operated jack unit shown has a collapsed height of 4 in. Rotation of the ¾-in. diameter, 10-pitch, horizontal jack screw with the crank raises the top plate a maximum of 6 in., to a height of 10 in. above the bottom plate. Two sizes of jacks have been constructed, one with 8 × 12 in. top and bottom plates and the other with 12 × 16 in. top and bottom plate.



Made in two sizes, with 12 × 8 in. or 12 × 16 in. top and bottom plates, this jack is easily constructed from ⅛ in. thick hot-rolled steel sections. Hinge pins are ⅜ in. in diameter

Angular Ejector Pins for Molds Prevent Surface Imperfections

BY H. G. WESSEL, WESTINGHOUSE AIRBRAKE COMPANY

Ejectors designed to serve also as movable molding sections can be utilized to improve finishes and eliminate excessive numbers of loose pieces in the cavity

THE PREVENTION of ejector pin marks on compression molded plastic parts—that must be free of projections or indentations on close tolerance working surfaces—often presents a problem in mold design that is not easily solved by application of conventional design principles. In many instances, the use of conventional design principles for molds results in makeshift methods for removal of the finished piece from the mold. Such methods usually tend to retard production and limit the use of high-speed molding operations to less critical parts.

A specific instance of this type of part is that shown in Fig. 1. This part is a component of an electrical equipment assembly and all surfaces of the part are in contact with other components. As this piece is the functional basis for the operation of all contacting components, dimensional accuracy and a surface finish without imperfection must be maintained.

During the period when demand for this part could be satisfied with hand molds, production speed was not an involved factor and the removal of the finished part was accomplished by the simple procedure of overturning the mold and tapping the part out. This primitive method could not, however, be included in the operation when necessity dictated the construction of a new mold for operation on an automatic molding press. A mechanical means of removing the part without defacing the surface was necessary.

Close examination of the design of the piece disclosed that only one section of the piece, the projecting teat used to locate the component on the base, deviated from a plane and was sufficiently small to act as a point of contact for an ejector pin. It had the additional advantage of being a cylindrical projection.

Maintenance of proper draft angles; and the desire to minimize the number of removable core pins in the mold; dictated that the two flanges be molded at the top of the mold with the two flange holes cored parallel to the direction of motion of the force. This permitted the use of fixed core pins for the flange holes and required but one removable core pin for the base hole. The arrangement also placed the locating teat, which is parallel to the base hole, at an angle to the direction of force.

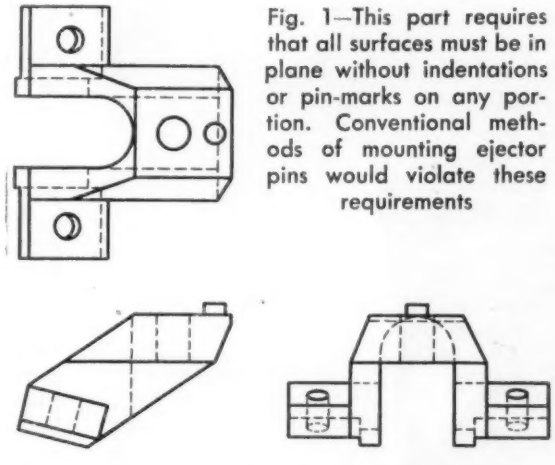


Fig. 1—This part requires that all surfaces must be in plane without indentations or pin-marks on any portion. Conventional methods of mounting ejector pins would violate these requirements

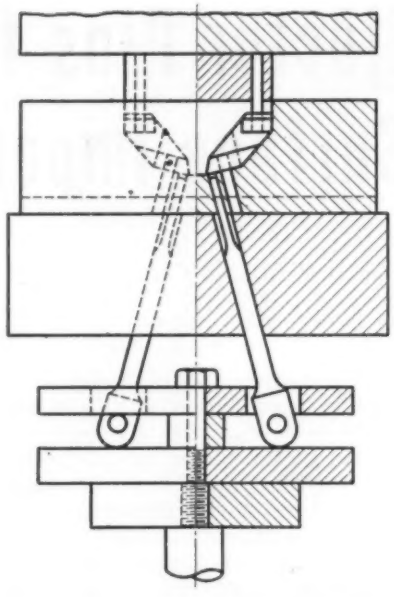
In constructing the mold, the ejector pin holes were drilled through the base of the mold at an angle corresponding to the angle of the hole and projection on the molded part. These holes were located directly under the small projection and were reamed large enough to permit a sliding fit for the ejector pins, made with a square head having a rounded end. The square heads of the pins were drilled and reamed to a press fit size for a hardened steel pin. The ejector pins were made of a uniform length from the rounded end on the square head to this reamed hole. The pins were hardened and then ground to a total length which permitted the small circular projection to be molded in the upper portion of the ejector pin holes.

Two hardened and ground steel plates were fastened together with a spacer between them. This spacer was ground to a thickness which permitted a sliding fit between the rounded end of the ejector pin and the hardened steel pin in the head. The lower of these steel plates was plain and fastened to the knockout mechanism of the press. The upper steel plate was made with rectangular holes through it. The width of these rectangular holes were made sufficiently large to permit the square head of the ejector pins to slide through freely and still prevent the pin from turning. Length of these rectangular holes was unimportant, but made long enough to clear the head of the ejector pin at all points during the movement of the knockout mechanism of the press.

During the upward stroke of the knockout mechanism, the lower steel plate exerts pressure on the rounded end of the ejector pins, forcing them to follow the angular holes in the mold and its supporting plate. This angular movement causes the ejector pin head to move horizontally between the two steel plates. The rounded ends of the ejector pins consequently were sliding on this lower hardened steel plate. The upward stroke of the knockout mechanism was set to stop when the small ends of the ejector pins were approximately ⅛ in. apart. At this point, a jet of compressed air removed the parts from the mold.

When the press knockout mechan-

Fig. 2—Solution to the problem uses the ejector pin as a movable mold section, thus assuring quality of surfaces without interfering with production speed



ism was retracting or moving downward to the molding position, the upper of the steel plates was in contact with the pins. This downward motion pulled the ejector pins back into molding position in the angular holes. The mold was again ready to receive the next charge of molding powder.

This construction of the mold and ejector pin movement, during several years operation, has caused less trouble than molds with the conventional vertical movement of the ejector pins.

FOOT-OPERATED RIVETING FIXTURE SPEEDS ASSEMBLIES

Nose spinner arming vane assemblies for bomb fuzes are assembled and riveted in a fixture which uses a small pneumatic hammer to head two small rivets at the same time. The operator places two roundhead rivets in the baseplate of the fixture, then secures a vane with her right hand and places it over the rivets in the fixture while, with her left hand, she assembles a vane holder cap and ring and a brass sleeve. These three parts are placed as a unit over the vane piece with the two rivets extending through the holder cap. A foot treadle brings the upper slide of the fixture down over the assembled parts and causes a bar cam to pass over the button of an air valve, actuating the riveting hammer. *Carter Carburetor Corporation.*

Safety Precautions For Cleaning Machinery

RECONVERSION means that much of the machinery stored for the duration needs cleaning before it can again be used. Plants using organic solvents for this purpose, many of them handling these chemicals for the first time, should take special safety precautions against fire and illness.

Solvent vapors can be injurious to health. Good ventilation is, therefore, essential wherever organic solvents are employed. Best procedure is to use properly designed degreasing equipment or a mechanically ventilated spray booth. If a plant which has no such equipment must do a considerable amount of machinery cleaning, it is advisable to install a special ventilator for handling the solvent vapors. Small parts may be cleaned under a ventilated hood. Such apparatus is not expensive, and may be used safely when designed and installed under the supervision of a degreasing expert.

If the amount of cleaning is not great, individual protection for the workers may be provided by means of gas masks of types approved by the Bureau of Mines for the specific conditions involved. Where the operator is provided with a mask, however, care should be taken that nearby workers are not exposed to solvent vapors.

Workers on or near cleaning operations should be instructed to report promptly any strong solvent odor. Symptoms of illness, such as nausea, dizziness, headache, stomach or visual disturbances, should immediately be reported to the plant physician or nurse, who must be kept informed of the solvents in use.

Skin troubles may be caused by frequent or prolonged contact with solvents. Where it is not possible to avoid contact with solvents, skin difficulties may be prevented by providing workers with protective clothing, or creams, and good washing facilities.

The chlorinated solvents, such as trichlorethylene, carbon tetrachloride, and perchlorethylene, are not fire hazards, and can be used safely as long as proper ventilation is provided. The petroleum solvents, on the other hand, are highly flammable, and require extra precautions.

Practical Ideas

HAVE YOU A PRACTICAL IDEA?... If so, send it in. Your idea will help other men, in other shops, who have a problem similar to yours. We pay for acceptable contributions prepared exclusively for this publication

Quick Releasing Chuck for Holding Second Operation Threaded Parts

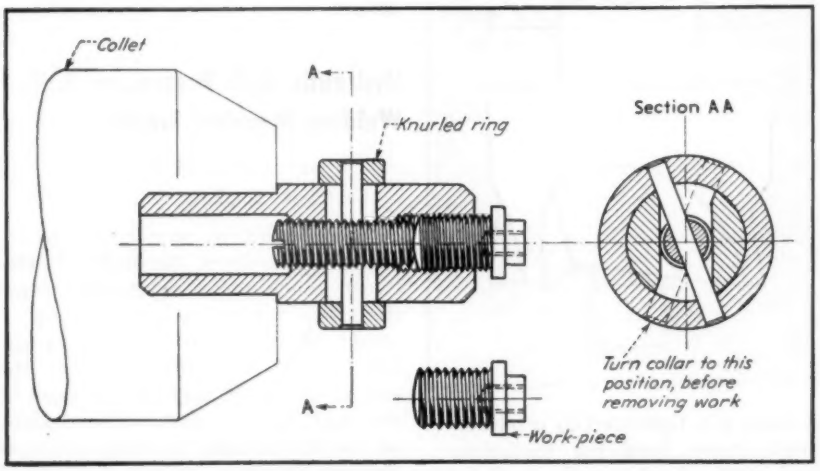
BY EMIL WITTMAN

For holding parts by the threaded end, without damaging the thread while secondary operations are performed, a chuck has been developed which holds the piece firmly on center by utilizing its own threads.

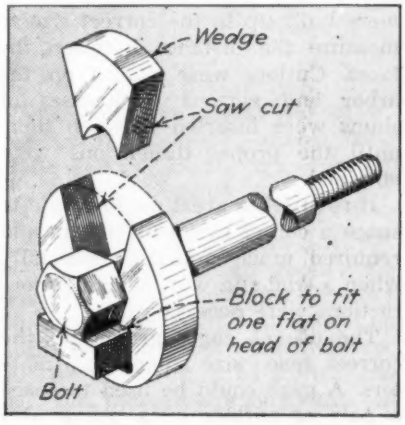
A piece of round bar stock is turned to fit the collet of a lathe, then it is drilled through and tapped to accommodate the threaded end of the piece to be worked upon. Depending upon the size of the threaded part, a larger or smaller drilled and tapped hole might be required for the backing-up screw. Through the body of the chuck a hole is slotted at right angles to the centerline. This slot must be large enough circumferentially to permit cross-pin movement sufficient to break contact between the backing-up screw and the threaded part. There must also be ample axial clearance to provide for longitudinal movement of the pin due to the thread.

The assembly consists of a backing-up screw threaded into the chuck body from the rear. On the outside of the chuck is a knurled ring wide enough to cover the slot in chuck body. A hole is drilled through both sides of this ring and through the backing-up screw. Through these holes is a pin for transferring motion from the knurled ring to the backing-up screw; this pin is peened over lightly to hold it in place.

The chuck is mounted in a lathe collet, then the threaded piece is run into the chuck until it touches the backing-up screw. Final tightening is obtained by turning the knurled ring until the backing-up screw jams tightly against the end of the threaded piece. After all operations are complete, release is obtaind by turning the knurled ring in a clockwise direction. Then the threaded part is quickly removed from the chuck by unscrewing the threaded piece out of the chuck.



By jamming the end of one screw against another, a threaded part is held in a chuck and secondary machining operations performed. Release is obtained by turning a knurled sleeve which retreats the backing-up screw



Parts can be changed in this simple fixture by releasing only one chuck jaw. Centering each part is eliminated

Chuck Attachment Simplifies Holding of Shoulder Bolts

BY ELLIOTT L. STURTEVANT
New England Shipbuilding Corporation

A centering operation each time a shoulder bolt is mounted in a lathe has been eliminated by a simple fixture mounted in the lathe chuck. The device could be adapted to fit any type of part with a uniform surface for mounting in the fixture.

The fixture was made by turning down a piece of steel to fit the chuck jaws and drilling a center hole to fit the shoulder of the bolts to be chucked. A wedge-shaped segment was then cut from this disk with two saw cuts. A small block of steel was welded to the back of the fixture in position to fit one flat on the head of the bolt.

The fixture was then mounted in a four-jaw chuck so that one jaw supported the wedge and the other three jaws held the remainder of the fixture. A shoulder bolt was placed in the fixture and carefully centered. Bolts can be changed by releasing the jaw holding the wedge, inserting a new bolt, and tightening. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

Accurate Spacing Gages for Gang Milling Cutter Set-Up

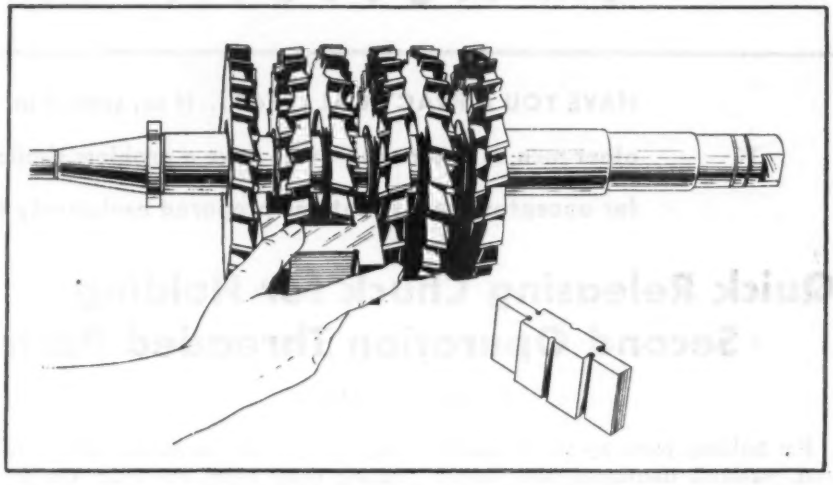
BY DONALD CLARK
Aircraft Engine Division,
Packard Motor Car Company

When gang-mills were assembled on an arbor with the intention of having accurate spaces between the side cutting faces, Johansson blocks were built up to the correct size to measure the distance between the faces. Cutters were placed on the arbor and various thicknesses of shims were inserted between them until the proper dimensions were obtained.

It required a great deal of time to space a complete set of cutters and required much patience, especially when a trial run was made and corrections were necessary.

The use of gages ground to the correct space size stepped up matters. A gage could be used to space a pair of cutters or a group, depending upon the accuracy required and whether one face must be in very close relation to several others.

With these gages, gangs of cutters can be assembled in the toolroom and given to the operator the same way as other tools. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



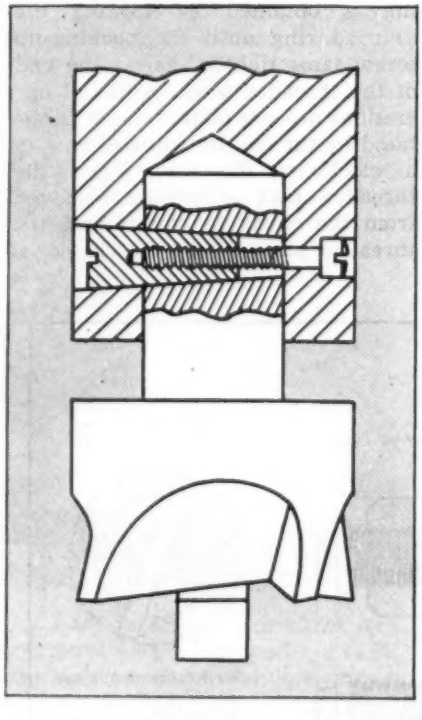
Milling cutters can be spaced accurately on an arbor by the use of ground spacing gages

Threaded Lock-Pin Replaces Taper Pin in Toolholder

BY JOHN RUSSELL
Aircraft Division,
Packard Motor Car Company

Previously, a cutter used for spotfacing was held in the sleeve of a holder by a small cylindrical pin pressed into the hole through the holder sleeve and the tool shank. Because the hole in the sleeve of the holder was larger than the hole in the tool shank, there was some backlash which caused chatter marks in the work which resulted in dulling the cutter quickly. To eliminate this, the toolmakers would rivet the ends of the pins to hold the tool firmly in place. This hammering raised burrs on the outside of the sleeve and these burrs scored the inside of the jig bushing in which the tool revolved. Repeated change of the cutters eventually made it impossible to use the toolholder in the bushing.

To overcome this difficulty, a tapered lock pin was made in which one end was drilled and tapped for a fillister-head screw. One side of the sleeve of the holder and the shank of the tool were drilled and reamed to fit the taper pin, the other side was drilled and counterbored. The tapered pin was inserted, then the screw was turned down hard to draw the tapered pin into a close fit. The whole assembly was but the matter of a few minutes against a half hour required by the straight pin method.



A taper pin, tightened by a fillister-head screw, held the toolholder and cutter shank together without any backlash and made tool replacement but the matter of a few minutes

Previously, when the cutter had to be changed, the services of a toolmaker were required for the straight pin, now, the operator changes the tools himself by the use of a screwdriver. This has reduced breakage, improved the quality of the product and released toolmakers for other more important work. The taper pin wedges into the sleeve of the holder and the tool shank, making a tight fit which can always be taken up if, through constant use, there should develop any movement between them. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

Hydraulic Jack Presses or Pulls Welding Machine Rotors

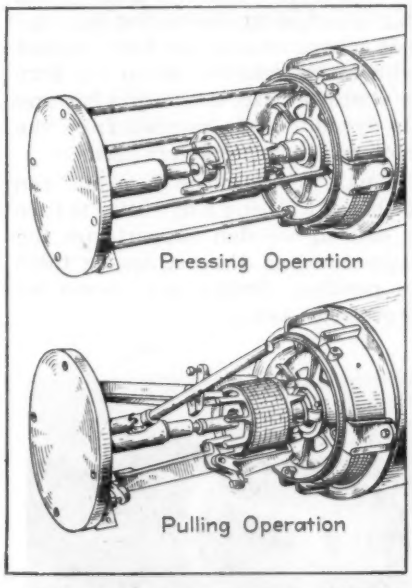
BY L. A. RICHMOND
California Shipbuilding Corporation

It is a problem, sometimes, to remove a rotor from the shaft of electrical machinery, especially when there is no intention to disturb other rotors which may be on the same shaft. If a sledge is used, the end of the shaft may be damaged or the shaft may be distorted or moved in its relationship to other parts of the equipment.

An hydraulic jack is a means for applying a smoothly acting pressure which is easily controlled. For

pulling off a rotor, the jack is mounted on a heavy plate and the customary pulling arms fastened to the jack bedplate and hooked over the rotor. The hydraulic jack ram pushes against the end of the shaft without concussion, but moves the rotor along the shaft.

To push on a rotor, the jack bedplate is attached by long studs entering holes in the machine frame and a corresponding number of holes in the bedplate. Pressure is applied by pushing against the rotor. Here again, the steady pressure of the



Hydraulic jack pressure provides a convenient method for changing the rotor of a welding machine

hydraulic ram causes the rotor to move along the shaft until the rotor is in correct position. Changing the rotor demanded the attention of one man for forty minutes, a time saving of almost 90 percent. All this without damaged parts but an easier method of operation. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

Router Bit Collet Holds Tool Concentric and Tight

BY IRA DALE ALSPACH
Douglas Aircraft Company, Inc.
Santa Monica

The usual method for holding the router employed two setscrews. When the collet became worn through use, it was necessary to tighten the setscrews much more than usual, resulting in the tool being thrown off center. With the router running off center, faulty work was produced and many bits were broken. In general, there was no positive method of holding the bit on center.

A new collet was made by utilizing the principle of the spring collet. A hole large enough to take the shank of the router was drilled in one end of the spindle, then the outside was tapered and threaded to receive the closing nut. Finally, three slots were milled so that when the nut was tightened the collet closed equally about the router bit shank and located it concentric with the center of the shaft.

The result of this improvement was satisfactory work with the bit running true, very little possibility of the bit becoming loose and damaging the material, also fewer bits were broken. *War Winning Suggestions from the Board for Individual Awards, War Production Drive.*

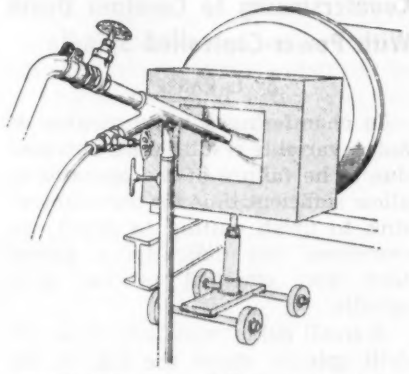
Preheating Valve Disks Before Refacing With Stellite

BY CURTIS S. DOTY
Philadelphia Navy Yard

To flow Stellite on a metal surface and make it stick, the base metal must be at a temperature of 1050 F.; if the metal cools too much, it is not possible to apply Stellite to the surface.

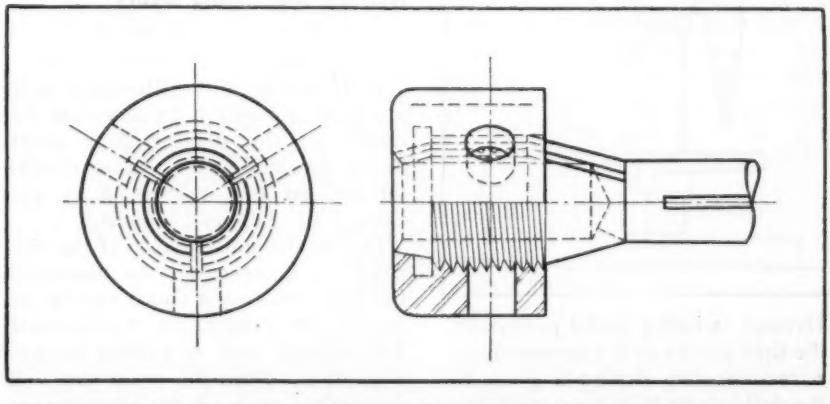
The previous method had been to preheat the high-pressure valve disk, then position it on a stand for welding. Because the disk was exposed to the atmosphere, the temperature dropped to the point where it became impossible to flow Stellite on the metal, requiring reheating.

Due to the use of a heating furnace, the disk can be brought to the welding temperature by playing the flame of a torch upon it, the disk being rotated during the heating period. A front door of the furnace permits the torch flame to heat the disk, but there is a door at the top through which the welding rod enters and all hard facing is done from this point. A metal box surrounds the disk during the heating process; this protection and the constant heating maintains the disk temperature at the welding point. After the facing has been applied, the torch is backed away and the metal box swung open, enabling the disk to be removed.



Maintaining the valve seat at a uniform temperature assures uniform and satisfactory refacing with Stellite

The use of this metal box has increased production 50 percent, a better quality of work has resulted, reheating has been eliminated and the operator is protected from sparks, dripping metal and radiant heat due to the flame playing upon the valve disk. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



With the collet split at three places, tightening the collet nut closed the jaws uniformly about the bit shank and held it central

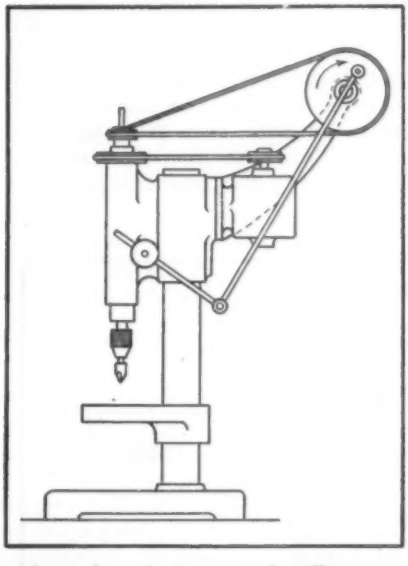
Countersinking to Constant Depth With Power-Controlled Spindle

BY L. KASPER

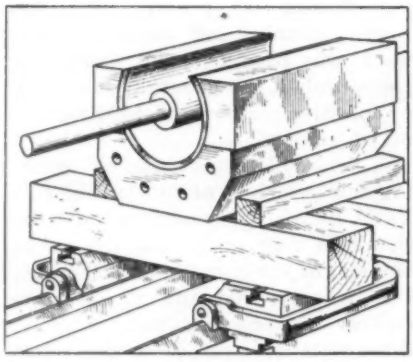
In chamfering a large number of holes, variable results were obtained due to he failure of the operator to allow sufficient time for the countersink to finish cutting to depth. To overcome this difficulty, a power feed was attached to the drill spindle.

A small pulley was fastened to the drill spindle above the top of the head; on a bearing attached to the back of the frame is a horizontal countershaft supporting a large pulley, which is lined up to take a quarter twist belt from the spindle pulley. A stud is mounted on the pulley or on a separate disk to act as a crank to obtain reciprocating motion. From the crank to the end of the hand feed lever a connecting rod is journaled at the upper end to the rotating crank and at its lower end to the hand feed lever by the use of a clevis.

Rotation of the drill spindle makes the crank on the large pulley turn and reciprocates the connecting rod causing the hand feed lever to oscillate: this up and down motion moves the drill spindle into and out of contact with the piece to be countersunk. The distance moved is set, so the countersink always goes a fixed distance.



Through reducing speed pulleys on the drill spindle and a countershaft, a reciprocating motion is given to the drill spindle by a crank and connecting rod to the hand feed lever



A large, three-piece bearing is shimmed to position on the saddle of the lathe. A fly cutter fastened to the boring bar swung between centers removes the excess metal

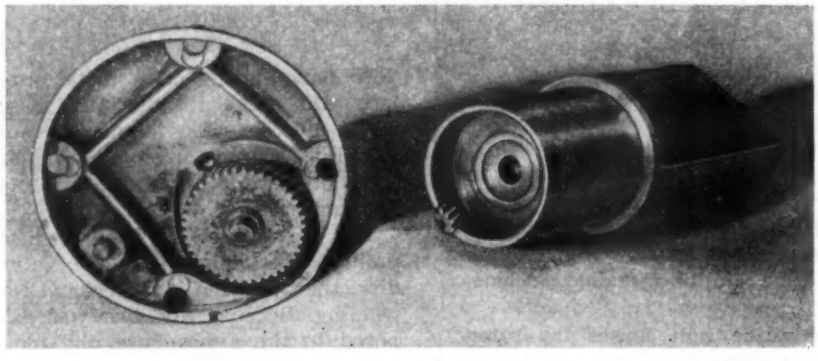
Three-Piece Heavy-Duty Bearing Bored in a Large Lathe

BY GEORGE HOLMAN

The parts of a heavy-duty three-piece bearing are rebabbitted individually, the excess babbitt is dressed off the flat surfaces of each piece and then the bearing is assembled in a lathe for boring. Because the finished work does not have to be extremely accurate, the bearing is shimmed to position on the saddle. Close location can be obtained by the use of hermaphrodite calipers for measuring the distance from the tool tip to prominent points on the bearing, after which the bearing is fastened in position.

The boring bar is supported between centers and is driven by dogs or clamps attached to the faceplate or chuck. The cutter is a tool steel bar attached to the boring bar. Inside measurements are first checked with inside calipers. When the bore is almost to size, the boring bar and its fly cutter are dropped from the centers and micrometers used.

Small, single-piece bearings can be bored by using a fly cutter to turn a seat in wooden supports on the lathe carriage, then strapping them in position. Boring and measuring proceed as before.



A tool, with a pinion segment rigidly attached to it, prevents the chuck gear from rotating and makes removal of the drill chuck a simple matter

Electric-Drill Chucks Removed Without Damaging Gears

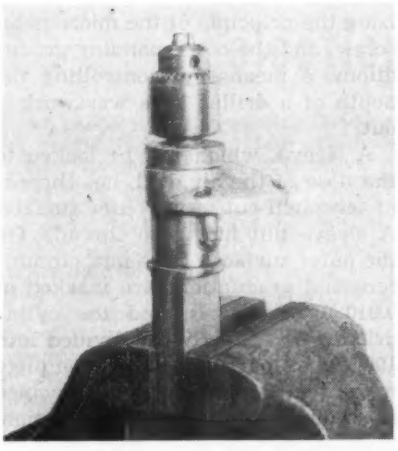
BY HERMAN C. WILKE
The Glenn L. Martin-Nebraska Company

Drill chucks for a Hi-Cycle drill are held in position by screwing the chuck on the driving gear shaft. From continuous use, these chucks tighten on the driving shaft and cannot be removed quickly.

Due to the construction of the machine, it is necessary to dismantle the drill before the chuck can be removed for repairs or replacement. The driving gear is located in such a position within the cover that it is impossible to hold the gear to remove the chuck; because of this difficulty, gears have been damaged.

A tool, which can be gripped in a vise, was made to hold the main gear stationary. A counterbore large enough to fit over the outside diameter of the gear serves as a locator. In the side of this counterbore is placed the segment of a driving pinion. The stem of the tool is flattened on the sides to afford a good gripping surface for the vice.

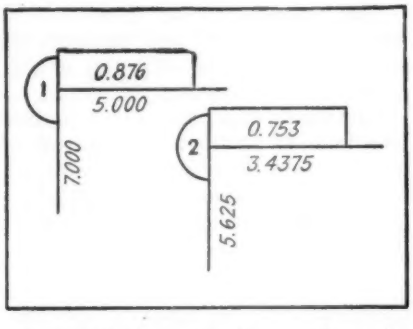
To remove the chuck, the tool is held in the vise and the cover holding the drive gear and chuck is placed in position on the tool. Because the pinion segment is rigidly attached to the tool, there cannot be any movement of the chuck and its gear once the pinion is in mesh.



The tool is gripped in the jaws of a vise, then the cover holding the drive gear and chuck is placed over it. The stationary pinion prevents movement of the gear when the chuck is loosened

With the gear prevented from moving, it is a simple matter to start the chuck from the threaded end of the shaft.

With this tool, gears are no longer damaged and the chuck can be removed almost instantly, representing a saving of nearly two hours per drill. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



A semicircle is for the number of the hole, the rectangle gives the size of the hole, and the dimensions horizontally and vertically are the coordinates locating the holes

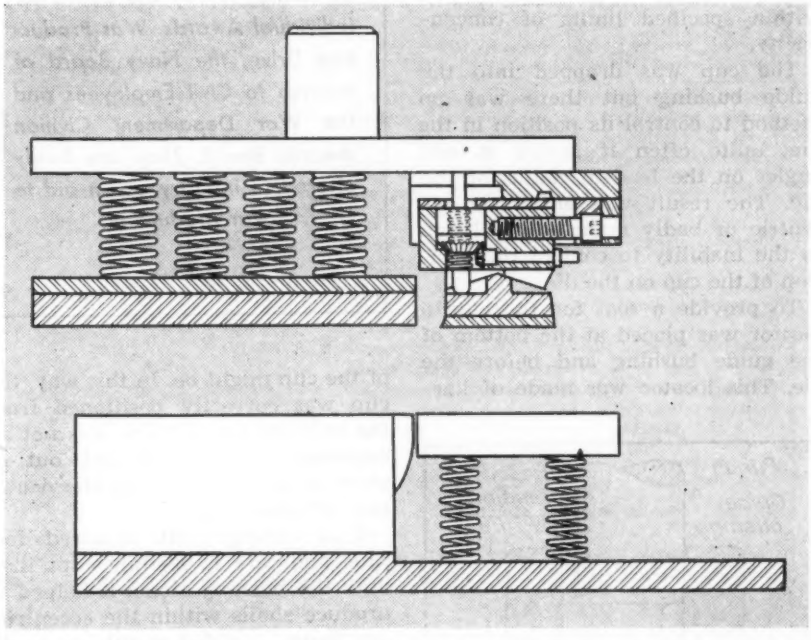
Rubber Stamp Locates Dimensions For Jig Boring Holes

BY VICTOR J. ZDANIS

Here is an aid to a jig borer operator. It is a rubber stamp having a number of advantages over the usual method of dimensioning holes.

The form of this rubber stamp has a place for the number of the hole, another space for the size of the hole, and the places for the coordinate dimensions show their directions.

The advantages of this method of laying out coordinates over the pencil and ruler method can be listed as follows—saves time, eliminates messy layouts, avoids eyestrain, the stamp is cheap and lasts a long time and the information needed for each hole to be bored is clear, compact and avoids confusion.



To form a joggle in shapes, a fixed pad in the lower part of the tool has a corresponding spring pad in the upper part to hold the shape in position.

Joggle Die Adjustable for Various Amounts of Offset

BY O. J. FLAMMINI
Douglas Aircraft Company, Incorporated
Chicago Plant

Customarily, joggle tools are made for a fixed amount of offset and anything beyond this requires extensive alterations.

Here is a joggle die which can be adjusted for a wide variation in the amount of joggle without making any changes in the tools.

The lower part of the tool has a solid pad which holds the shape firmly in place while the free end is spring cushioned to take care of the amount of offset. The upper part has a spring pad directly over the solid pad in the lower tool, but the adjustable joggle part is directly over the spring pad in the lower part.

Adjustment is obtained by turning a shaft which has a bevel gear meshing with a similar gear whose shaft is threaded into the joggle pad at one end but the other end fits into the upper plate. The adjustable end can be moved longitudinally to suit the conditions relating to the offset.

The principle of operation is to place the piece on the lower part of the tool, after the joggle has been properly set, then set the press into motion. The upper spring pad contacts the shape and holds it in position. The joggle pad then comes into contact with the shape: as the ram descends, the spring pad in the lower tool is compressed and the shape is carried downward in a position parallel to the rest of the piece: compression of the spring pad in the upper tool grips the shape more firmly against movement in any direction.

The amount of joggle can be varied from the thickness of a metal plate to as much as ¾ in. depending upon conditions. Because the joggle pad holds the end hard against the spring pad, the offset end is drawn down parallel. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

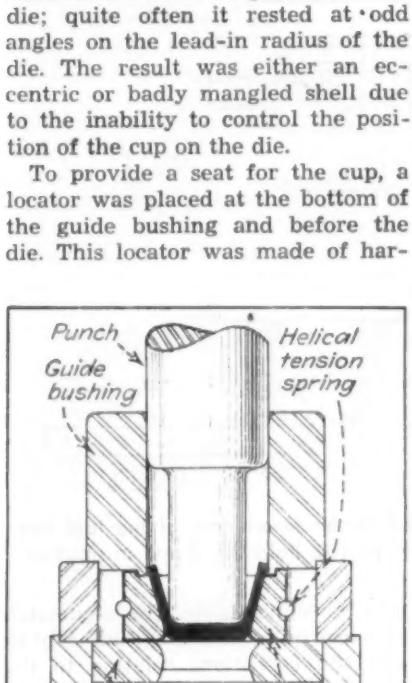
Locator for Correct Positioning Feeds Blank to Drawing Die

BY JOHN F. CAVANAGH, JR.

In deep drawing steel shells, from hot forged cups, it was found necessary to provide the punch with a guide bushing to produce a shell within specified limits of concentricity.

The cup was dropped into the guide bushing but there was no method to control its position in the die; quite often it rested at odd angles on the lead-in radius of the die. The result was either an eccentric or badly mangled shell due to the inability to control the position of the cup on the die.

To provide a seat for the cup, a locator was placed at the bottom of the guide bushing and before the die. This locator was made of hardened and ground tool steel, its inner face was bored to fit the exterior of the cup, after hardening and grinding it was separated into four equal segments; the group was held together by a helical spring wrapped about and resting in a groove in the side of the locator.



A locator, made in segments, locates and guides the cupped forging in its progress through the die, assuring shells within the required limits

With the spring holding the locator segments together, they could expand as the tapered cup was pressed into and through the die; the sides of the segments never changed their angularity but always formed a guide no matter what the position of the cup might be. In this way, the cup was correctly positioned from the beginning and there was not an opportunity for it to get out of place at any time during the drawing operation.

This arrangement required less time and care in feeding cups than with the bushing alone; it helped to produce shells within the eccentricity limits, avoided mutilated shells and materially reduced scrap.

★

War-Winning Suggestions

appearing on these pages were selected from those recognized as meritorious by the Board for Individual Awards, War Production Drive, the Navy Board of Awards to Civil Employees and the War Department Civilian Awards Board. They are freely offered to industry as an aid to war production.

★

Micrometer Depth Attachment for Pneumatic Drills

BY HARRY HETU
Navy Yard, Mare Island

To drill a hole to exact depth with an air drill, without means for measuring penetration, means frequent stoppage of work and constant checking with a depth gage. Utilizing the principle of the micrometer screw, and the corresponding graduations, a means for controlling the depth of a drilled hole was worked out.

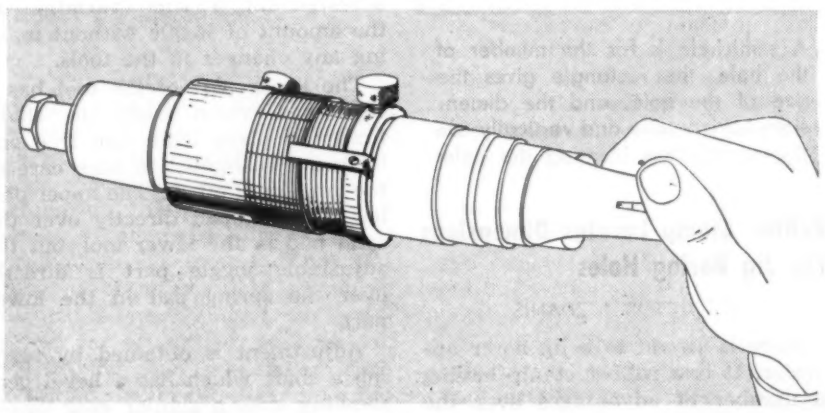
A sleeve, which can be locked to the nose of the air drill, has threads of ten pitch cut on its outer surface. A sleeve nut fits these threads. On the outer surface of the nut, circumferential graduations are marked at 0.010 in. intervals, and the cylindrical part of the nut is divided into 100 equal parts. For one complete revolution of the nut, the advance is 0.100 in., and the intermediate graduations are 0.010 part of 0.100 in., so each graduation is 0.001 in.

The nose of the nut is reduced in diameter for convenience of operation and observation. At the drill end there is a threaded sleeve fitting into the end of the nut. Adjustment, to compensate for drill length variation, is made by turning the sleeve; locknuts maintain its position. The hole in this sleeve is large enough to pass the drill freely. The nut can be locked in position with a thumb screw.

On the threaded sleeve is attached an arm with a knife edge on one side and end. From this arm, the tenths and thousandths of an inch are read off; with this attachment, the drilled depth can be controlled and held to 0.001 in.

The customary way is to drill a hole, stop the drill and measure its depth many times with the uncertainty of overrunning the depth.

The use of this attachment enables one man to do the same amount of work as was done with six and have very few mistakes as a result. *Suggestion Submitted under the Navy Employees' Suggestion Program.*



Micrometer adjustments are accurately made and held by use of a rotating sleeve held in position with a thumbscrew

Selection Guide for Electrodes—I

Over 90 percent of arc-welding electrodes currently produced fall within the classifications listed in "Tentative Specifications for Iron and Steel Arc-Welding Electrodes: A233-45T", issued jointly by the American Welding Society and the American Society for Testing materials. In preparing the latest revision of these specifications, the societies recognized the importance of an appendix, which would guide potential users of such electrodes toward an understanding of the best-suited applications of each class. This "Guide" explains the concept of the classification numbering system used in the specifications, and provides a summary of those electrode characteristics which are most important.

The mechanics of the numbering system used in Specifications A-233 are relatively simple. In any classification number, the prefix *E* designates a metal-arc-welding electrode, the first two digits stand for the minimum allowable tensile strength of stress-relieved deposits in thousands of pounds per square inch (except the E45 series where the non-stress-relieved condition is the basis), and the last two digits designate respectively the positions and current characteristics for which the electrode is useful.

By knowing the significance of the various digits used in the classification, it is simple to use the method, which is consistent throughout the several series. Reference to the accompanying table establishes the following facts for the E60 classification:

E6010 designates an all-position electrode (only in diameters up to and including 3/16 in.) useful with d.c. reversed polarity only. This statement applies to all other 10 classifications; namely E7010, E8010, E9010 and E10010.

E6011 is the a.c. counterpart of the E6010 electrode. Again, this is an all-purpose electrode (in diameters up to and including 3/16 in.) having the normal voltage arc and the deep penetration of the E6010 class.

E6012 is an all-purpose electrode (in diameters up to 3/16 in. inclusive) useful with a.c. and d.c. and either polarity. Both E6012 and E6013 electrodes are characterized by a low-voltage arc and consequent lack of penetration, but they are the easiest to use in all positions, particularly because of their ability to bridge gaps.

E6020 and E6030 electrodes are similar, the latter producing deposits of maximum fluidity and therefore suitable only for flat-position welding. The E6020 electrodes give slightly less fluid deposits, and hence in diameters to ¼ in. inclusive can be used in making horizontal fillet welds. Any E6020 electrode will fulfill requirements of the E6030 class but the reverse is not true.

From the foregoing discussion it is possible to interpret an E8010 classification as follows:

1. The minimum tensile strength re-

POSITIONS AND CURRENT WITH WHICH ELECTRODES CAN BE USED

Covering	Electrode Classification Number	Capable of Producing Satisfactory Welds in Positions Shown[a]	General Description
E45 Series—Minimum Tensile Strength of Deposited Metal 45,000 P.S.I. — Non-Stress-Relieved			
Light	E4510	F, V, OH, H	Sulcoated or light coated electrodes for usein manual welding but sometimes used for machine welding.
	E4520	H-Fillets, F	Light coated electrodes for use with high speed machine welding. May be used for manual welding.
E60 Series—Minimum Tensile Strength of Deposited Metal 60,000 P.S.I. in Stress-Relieved Condition; 62,000 P.S.I. in Non-Stress-Relieved Condition.			
Heavy	E6010	F, V, OH, H	For use only with d.c. reversed polarity (electrode positive).
	E6011	Fm Vm OH, H	For use with a.c. or d.c. reversed polarity
	E6012	F, V, OH, H	For use with d.c. straight polarity (electrode negative) or a.c.
	E6013	F, V, OH, H	For use with a.c. or d.c. straight polarity (electrode negative) on light gage metal.
	E6020	H-Fillets, F	For use with d.c. straight polarity (electrode negative) or a.c. for horizontal fillet welds and d.c. either polarity or a.c. for flat position welding.
	E6030	F	For use with d.c. either polarity or a.c.
E70 Series—Minimum Tensile Strength of Deposited Metal 70,000 P.S.I. — Stress-Relieved			
Heavy	E7010	F, V, OH, H	For use only with d.c. reversed polarity (electrode positive).
	E7011	F, V, OH, H	For use with a.c. or d.c. reversed polarity
	E7012	F, V, OH, H	For use with d.c. straight polarity (electrode negative) or a.c.
	E7020	H-Fillets, F	For use with d.c. straight polarity (electrode negative) or a.c. for horizontal fillet welds and d.c. either polarity or a.c. for flat position welding.
	E7030	F	For use with d.c. either polarity or a.c.
E80 Series—Minimum Tensile Strength of Deposited Metal 80,000 P.S.I. — Stress-Relieved			
Heavy	E8010	F, V, OH, H	For use only with d.c. reversed polarity (electrode positive).
	E8011	F, V, OH, H	For use with a.c. or d.c. reversed polarity
	E8012	F, V, OH, H	For use with d.c. straight polarity (electrode negative), or a.c.
	E8020	H-Fillets, F	For use with d.c. straight polarity (electrode negative) or a.c. for horizontal fillet welds and d.c. either polarity or a.c. for flat position welding.
	E8030	F	For use with d.c. either polarity or a.c.
E90 Series—Minimum Tensile Strength of Deposited Metal 90,000 P.S.I. — Stress-Relieved			
Heavy	E9010	F, V, OH, H	For use only with d.c. reversed polarity (electrode positive).
	E9011	F, V, OH, H	For use with a.c. or d.c. reversed polarity
	E9012	F, V, OH, H	For use with d.c. straight polarity (electrode negative), or a.c.
	E9020	H-Fillets, F	For use with d.c. straight polarity (electrode negative) or a.c. for horizontal fillet welds and d.c. either polarity or a.c. for flat position welding.
	E9030	F	For use with d.c. either polarity or a.c.
E100 Series—Minimum Tensile Strength of Deposited Metal 100,000 P.S.I. — Stress-Relieved			
Heavy	E10010	F, V, OH, H	For use only with d.c. reversed polarity (electrode positive).
	E10011	F, V, OH, H	For use with a.c. or d.c. reversed polarity
	E10012	F, V, OH, H	For use with d.c. straight polarity (electrode negative), or a.c.
	E10020	H-Fillets, F	For use with d.c. straight polarity (electrode negative) or a.c. for horizontal fillet welds and d.c. either polarity or a.c for flat position welding.
	E10030	F	For use with d.c. either polarity or a.c.

[a] The abbreviations F, H, V, OH, and H-Fillets, indicate welding positions as follows:
F—Flat
H—Horizontal
V—Vertical
OH—Overhead
} For electrodes 5/16 in. and under
H-Fillets—Horizontal Fillets

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Selection Guide for Electrodes—II

quirement in the stress-relieved condition is 80,000 p.s.i.

2. It is an all-position electrode; that is, it may be used in the flat, horizontal, vertical and overhead positions in sizes up to 3/16 in. inclusive.

3. The electrode operates satisfactorily only with d.c., reversed polarity.

The descriptions that follow cover electrodes in the E60 series only, but, in general, parallel descriptions apply to corresponding classifications in the other strength ranges. The tables of mechanical properties are included to illustrate the differences that may be expected, as compared with the minimum tensile strength stated for each classification.

E6010 Electrode

Class E6010 electrode is designed to produce the best possible mechanical properties consistent with good usability characteristics in all welding positions. It is characterized by a deeply penetrating, forceful, spray-type arc and readily removable, thin, friable slag which may not seem completely to cover the deposit. Fillet welds are usually relatively flat in profile and have a rather coarse, unevenly spaced ripple. The covering is high in cellulose usually exceeding 30 percent by weight: other materials include titanium dioxide, various types of magnesium or aluminum silicates, metallic deoxidizers such as ferromanganese and liquid sodium silicate. The core wire is usually a rimmed steel containing 0.10 to 0.14 percent carbon, 0.40 to 0.60 percent manganese, 0.04 percent maximum sulfur and phosphorus, and 0.025 percent maximum silicon.

This classification is always recommended for all-position work where the quality of the deposit is of greatest importance, particularly on multipass applications in the vertical and overhead position, where radiographic requirements must be met.

The majority of its applications are on mild steel. However, it has been used on galvanized plate and on some low-alloy steels. Typical applications include ship building, buildings and bridges, storage tanks, piping, and pressure vessel fittings. In some cases the 3/16 in. diameter is available in two covering thicknesses. Improved mechanical properties are obtained with the heavier covering at some sacrifice of operating characteristics in the vertical and overhead positions. Sizes larger than 3/16 in. are, of course, not generally used in all positions.

Maximum currents that can be used with this type of electrode are somewhat limited as compared to E6012, E6013, E6020, or E6030 types due to the high spatter loss. The following table may not apply to every brand produced but will be found satisfactory for most brands.

Electrode, Diameter, in.	Current, amp.	Voltage, arc volts
1/16	20 to 40	20 to 22
5/64	20 to 80	23 to 25
3/32	80 to 120	24 to 26
7/64	120 to 160	24 to 26
1/8	140 to 220	26 to 30
9/64	170 to 250	26 to 30
5/32	200 to 300	28 to 34
3/16	250 to 450	28 to 34
7/32	300 to 500	30 to 35

When used in the vertical and overhead positions, currents nearer the lower limit should be used.

The range of mechanical properties to be expected when deposited in accordance with the test procedures prescribed in the specifications are shown in the following table:

	As Welded	Stress-Relieved
Tensile strength, psi.	62,000 to 70,000	60,000 to 62,000
Yield strength, psi.	52,000 to 58,000	47,000 to 54,000
Elongation in 2in., per cent.	22 to 28	27 to 34
Reduction of area, min., per cent.	35	45
Impact resistance, ft-lb., izod.	50 to 70	
Endurance limit, psi.	28,000 to 32,000	
Density, g. per cu. cm.	7.82 to 7.86	
Brinell hardness number.	140 to 160	

Chemical composition of the deposited metal, uncontaminated by plate material, will usually show less carbon and manganese than the core wire. The phosphorus and sulfur will not exceed 0.04 percent each. The silicon content, however, will be higher than that of the core wire.

Generally speaking, E6010 electrodes will comply with the requirements of the following codes or specifications:

1. U. S. Army Specification No. 57-203, Type I, Class A.
2. Army-Navy Aeronautical Specification, AN-E-9, Class B.
3. American Bureau of Shipping.
4. A.P.I.-A.S.M.E. Code for Unfired Pressure Vessels, Paragraph W-520.
5. A.S.M.E. Code for Unfired Pressure Vessels, Paragraphs U-68, U-69 and U-70.
6. Navy Dept., Bureau of Ships, Specification 46E3(INT), Grade 1, Classes 1, 2 and 3.
7. Hartford Steam Boiler Inspection & Insurance Company.
8. Lloyd's Register of Shipping, Section 4, Paragraphs 1 and 9.
9. U. S. Coast Guard.
10. British Corporation Register of Shipping and Aircraft.
11. Building Codes of New York City, Pittsburgh, and many other municipalities.

E6011 Electrode

Classification E6011 electrode is designed to duplicate the usability characteristics and mechanical properties of the E6010 classification using alternating current as the source of power. Although also usable on direct current, reversed polarity, a sacrifice in usability characteristics will be noted. When used with direct current, straight polarity, as is sometimes done, some further sacrifice in usability characteristics is noticed. Penetration, arc action, slag and fillet weld appearance are very similar to that of the E6010 electrode.

The covering is also high in cellulose. In addition to the other ingredients usually found in the E6010 electrode coverings, small quantities of calcium and potassium are usually present. The core wire used, so far as is known, is identical with that used in E6010 electrodes.

Like the E6010 electrode it performs satisfactorily on galvanized plate. It is this characteristic plus its ability to produce fillet welds similar in size and appearance to the E6010 type when the same diameters are used, that provides the necessary distinguishing features to differentiate between it and the E6013 type. Like the E6010 electrodes, sizes larger than 3/16 in. are not generally used in all positions.

The current and voltage ranges usually recommended are identical to those of the E6010 electrode. As in the case of E6010 electrode high currents result in high spatter loss.

The range of mechanical properties to be expected are the same as for the E6010 electrode, except for tensile and yield strengths which are as follows:

	As Welded	Stress Relieved
Tensile strength, psi.	62,000 to 73,000	60,000 to 70,000
Yield strength, psi.	52,000 to 61,000	50,000 to 58,000

The chemical composition of deposited metal will fall within the same ranges as described for E6010 electrodes.

To be concluded in an early number.

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Gaging Business

Military Tool Cuts

Army and Navy machine tool cutbacks are expected to total a minimum of $30,000,000, and may indirectly bring in another $10,000,000 or so in cancellations by war contractors. In addition to this, military cancellations of various types will make idle thousands of government-owned machine tools and other equipment, which will have to be disposed of as surplus.

So far as the industry's current business status is concerned, the cancellation of some $40,000,000 in military orders, would still leave it with a backlog of about $200,000,000, or five months' business, in reconversion and foreign orders. This will bring the industry's backlog to the lowest point since early 1944. However, it will help tool builders to speed delivery of reconversion tools, shipment of which had been previously blocked by military and Russian lend-lease orders. The status of the remaining $40,000,000 in Russian unfilled orders remains up in the air until new lend-lease interpretations in the light of peace are made. Russia has been placing cash orders here for some time.

Other Market Impacts

But even though cancellation of military orders for machine tools will permit earlier deliveries of tools required for reconversion, there is some possibility that a sizable quantity of unrated orders may be cancelled because of the expected availability of hundreds of thousands of surplus government tools. Some of these tools are located in the plants of reconverting companies who were planning to buy new tools, because the government's tools were still engaged in war work.

About $100,000,000 of the present backlog consists of unrated orders, and another $40,000,000 consists of reconversion rated orders. This segment of the industry's business is now in doubt. Of the balance, there is a considerable amount of military rated business which was ordered by private companies doing war work.

The cancellation of military orders enabled WPB to abolish its E-1-B order, under which 75 percent of total tool production was set aside for military orders, and the balance was allocated to foreign purchasers and nonrated domestic orders. At the same time, the reporting form 417 was abandoned, thus terminating this valuable source of machine information.

Foreign Business Prospects

There is at least $10,000,000 in French and Belgian business now on the books of American tool builders, and some $40,000,000 additional in sight. India has been placing orders, too. But until now, the industry has been unable to promise prompt delivery. A few months ago, this resulted in the loss of some French business to Great Britain, which was able to promise better delivery. However, the military cuts now enable the industry to offer some very prompt shipments.

This will aid the industry's sales in Latin America, where demand has gone unfilled since 1941 due to the war. Now, with Germany out of the foreign tool market, indications are that the United States will get the lion's share of this business.

National Impact Severe

The $29,500,000 in VJ-cutbacks means a 94 percent slice in Army aircraft contracts, 98 percent in artillery and tanks, 98 percent in ammunition, 100 percent in construction equipment, 100 percent in locomotives and railroad cars, 100 percent in telephone and telegraph equipment, 80 percent in radio and radar equipment, and a practical end to the building of combat ships. For the nation, it is estimated by various government officials that these reductions will increase unemployment to 5,000,000 within three months.

For industry, it means adding these cancellations to the $14,000,000 now on the books awaiting settlement; it means extensive plant clearance of government-owned equipment and surplus materials; and it means the opportunity and responsibility for reconversion, as quickly as it can be accomplished.

Materials Supply Better

The wiping out of huge military orders for various types of steel and other materials will remove many reconversion bottlenecks. Army cuts mean the cancelling out of 99 percent of its steel needs and 98 percent of its copper and aluminum needs. One major reconversion bottleneck that has been wiped out is in flat-rolled steel, where large military orders were blocking reconversion. Now, the auto, refrigerator, washing machine and other reconverting industries should be able to get more of this sheet steel than they have previously hoped to get. This will mean better output than had been originally set on a quota basis. However, the time required to fully reconvert these industries may prevent them for accepting as much delivery of flat-rolled steel as may now be possible. In any event, the cancellation of CMP controls on steel, copper, and aluminum will help unravel the materials situation.

More than that, long deferred construction and maintenance work can be launched.

Industry should now be able to get most of the equipment it needs for reconversion and postwar.

Atomic Bomb Scientists—Among the leading scientists connected with the development of the two-billion-dollar atomic bomb are (from left to right) Sir James Chadwick, Great Britain; Maj. Gen. Leslie R. Groves, in charge of the Oak Ridge, Tennessee, project; Dr. Richard C. Tolman, of Office of Scientific Research and Development, Washington, D. C.; and Dr. H. D. Smyth, project consultant, from Princeton, N. J. The most destructive weapon developed during this war, the bomb was credited by the Japanese Emperor as having provided the most potent argument for his surrender

Peace Starts Big Reconversion Job, Lifting of Controls

No. 1 objective is to help industry employ 7,000,000 demobilized men. WPB will head task to carry out OWMR's policies. Huge munitions cuts free many materials

WASHINGTON—From the world's biggest war, in which it was the biggest munitions and supplies producer, in which it furnished the biggest navy and the second biggest army, the United States moved within 12 hours back to an all-out civilian program, with complete individual freedom of initiative.

Washington's No. 1 objective, implemented overnight after Jap surrender, was clear all government regulatory impediments and help industry to employ the 7,000,000 men to be demobilized, who constitute the nation's No. 1 problem. The only controls to be retained are to assist businesses that get into trouble.

War man power control was taken off entirely: workers can work when and where they choose. But wage stabilization measures will remain in effect for a while, along with some OPA price control, to curtail the threat of inflation.

WPB Executive Agency

The Government's policy is: Go ahead with your project, and if you are unable to get materials and equipment, call on the War Production Board. The Board is the executive agency that carries out the policies of the Office of War Mobilization and Reconversion. WPB retains all its wartime powers but will use them only when necessary.

The President's executive agencies had their peace programs ready, in contrast with Congress, which revealed a lack of over-all initiative and responsibility by going on a long vacation while most other people worked, leaving a half dozen important legislative jobs undone.

OWMR Optimistic

The President himself, and OWMR, and WPB, were all optimistic and vitally determined to put the country back to civilian work. John W. Snyder, OWMR director, said that, with the help of the nation, the government hopes eventually to provide:

1: Jobs for all those willing and able to work.

2: A steadily rising standard of living.

3: Stabilization of our economy to avoid disastrous inflation or deflation. Only peacetime production greater than this or any other nation has even seen, he says, will make possible these objectives. This program is expected to take 12 to 18 months.

The Army's great munitions order was cut 94 to 100 percent immediately. Stop order telegrams, ready in Army desk drawers, ticked off a few minutes after the President's announced peace, reducing Army procurement from $2,400,000,000 per month to $435,000,000 per month—more than half of that for food. Navy reductions will be much slower; the U. S. keeps a standing Navy, but depends on recruited ground forces.

Postwar Orders?

Armed forces could not reasonably argue that they need delivery now of any more munitions and supplies of any kind—excepting for maintenance of installations, equipment, transportation, and subsistence. That does not mean, however, that military orders will stay at zero. Depending largely on decisions by Congressional committees what size defense power will be maintained by the United States, munitions orders will be renewed, especially projects involving development and research and testing of advanced designs.

The aircraft industry, for instance, will ask the Army and Navy to sustain its productive sources with orders for one billion dollars worth of aeronautical products during the coming 12 months, and for about $600,000,000 worth of research and development work. If airplane producers win, one would suppose that chemical warfare, ordnance, and other branches should be able to win with the same arguments. Chief opposition will be the taxpayers, who will say that they must have money to absorb the vast civilian production being planned by the government. Aircraft and munitions makers can and do contend, in reply, that production of armaments can make prosperity in peace as in wartime.

Congress will be asked for legistion on unemployment compensation, revision of the wage-hour law to increase minimum wages, a tax program to stimulate production and purchasing, public works appropriations, continuation of the United States employment service, and others.

Practically all industrial materials became available overnight for civilian production—excepting lumber, tin, lead, rubber, textiles and a few others, including gasoline to move about on business and pleasure.

Mills Ship Unrated Orders, Pile Raw Steel Pending New Ordering

PITTSBURGH—The shock of cancellations of steel orders was tempered here by the fact that all mills were loaded up with unrated business, against which orders shipments are now being started. However, it is not clear whether all consumers will be able to absorb the full volume of their orders, which they had not expected to be shipped for some time. Meanwhile, the industry is engaged in a maze of bookkeeping in wiping out military orders from its schedules and rearranging civilian type orders.

Although prospects for immediate postwar steel consumption are very favorable, the fact that many consumers will be unable for the present to absorb steel as fast as it might be shipped will force the steel industry's operations down temporarily. This is true of the railroad equipment industry which cannot process finished steel as fast as the mills could ship it. Construction cannot go ahead fast enough, either.

Steel warehouses represent one place where the mills expect to find a quick home for their products. Oil fields represent another, and wire processors will also take all the steel they can get.

Until the pattern of reconversion orders becomes clearer and pending some indication of the extent to which unrated purchasers can absorb the entire steel ordered, mills will do some stockpiling in the form of ingots and slabs. This will help increase the output of the finishing mills later on. However, the correct type of analysis for storage either in ingot or slab form presents its own problem, although much of it will be steel for end purposes which are definitely known.

Auto Steel Questions

It is an accepted fact that auto steel will be available in larger quantity and earlier than had seemed possible a few weeks ago. However, there is some question now of whether or not the auto industry can absorb the steel as fast as it is available. The reason is that many auto companies had planned to concentrate their production on the later months of the year to give them a continuous run, which would be more economical than a slow, interrupted schedule. In addition, actual reconversion for many of them will still take months.

Detroit Letter

Warnings Crystallized

The end of the war has brought into the forefront the many knotty problems that these leaders of the automobile industry warned officials in the capital for nearly two years. In the sudden capitulation of Japan, following the almost equally sudden downfall of Germany, the manufacturers are caught with much of the pre-planning steps unaccomplished.

This means wide-spread unemployment, perhaps for months. It means delay in stepping up production from the handful which was grudgingly doled out to the industry on July 1 to mass production which will take up the slack in employment and feed a hungry market. This delay may run from six to eight months.

All this, far-sighted leaders in the industry foresaw and tried to warn Washington about many, many months ago. Their earnest pleas fell on deaf ears and now the piper must be paid.

Plant Clearance Problem

The problems of the industry have now taken a new tangent. Where before, materials were the big stumbling block which prevented the manufacturers from planning for mass production, now it is plant clearances—moving out government tools, getting rid of semi-processed goods and materials. And moving in, their own tools and equipment.

The feeling in the industry right now is to do the same with the government-owned machinery as was done with the private tools and equipment when conversion came—grease them up and move them out into the yards. Clear the way for peacetime tools at any cost, is the motto.

Some of the services are ready to move fast on contract terminations and plant clearances. The Army Air Forces here announced recently it had 2,000 men ready to send in at once to cut through red tape and clean out its machines, equipment and materials.

Industry Moving Fast

Despite all the obstacles, the auto industry is moving at a fast pace. With peace and the dropping of most of the restrictions, the manufacturers are prepared to go back to their old methods of doing business. They will work out their own problems on materials, prices and distribution.

Wide-spread assembly plants are being reopened and the process of decentralization is proceeding. General Motors has announced the reopening of its South Gate plant at Los Angeles this month and the Ford Co. is already producing cars from its Edgewater, N. J., assembly plant.

GM, in addition, has bought land for an assembly plant for Buicks, Pontiacs and Oldsmobiles at Doraville, near Atlanta, Ga. The west coast plant will start with Chevrolet trucks and chassis for school buses but will swing to Buicks, Olds and Pontiacs before the end of the year.

Low-priced Chevrolet

The new low-priced Chevrolet is stirring up much comment in automobile circles. Both GM and Chevrolet officials are tight-lipped when the new product is mentioned and the reports are that the latter did not want to take on this car as part of its operations but were bludgeoned into it by high corporation officials.

Next, it is said that Fisher Body, which builds bodies for all other GM lines, will not build the body for the new low-priced Chevrolet. The division expects to make its own bodies in its own plant. It hopes to better Fisher prices on the job too.

The new car will be made in Cleveland. It will be marketed through the same dealer setup as other Chevrolets but will have a separate engineering and designing staff.

War Jobs Affected by Cuts

WASHINGTON—Workers to be dropped by industries between the end of July and December are estimated by the War Manpower Commission as follows: (A) aircraft: 1,300,000 to 200,000 (B) Shipyards: 1,100,000 to 500,000; (C) Ordnance plants: 1,100,000 to 100,000; (D) War agencies: 1,600,000 to 1,200,000; (E) Munitions (metal, chemical, rubber) 7,900,000 to 4,100,000.

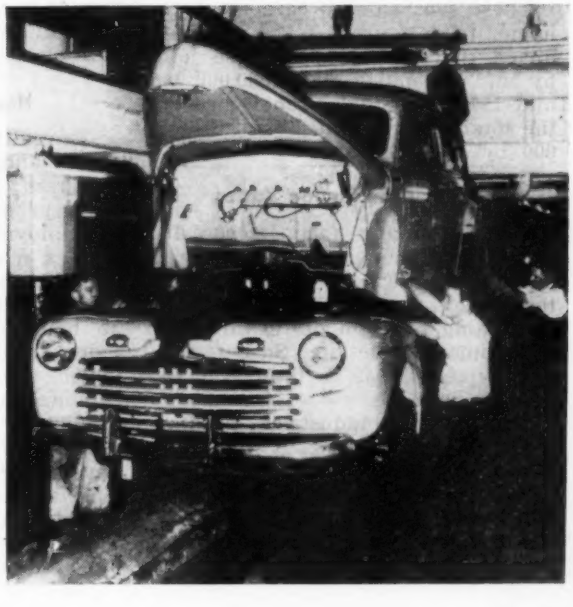
About 2,000,000 of these workers may find new employment in civilian production or in service enterprises. It is hoped that the end of the war will cause many temporary employees, such as housewives, young boys and girls, and over-age workers, to leave the work force. However, surveys have shown that fully 70 percent or more of women now employed wish to remain in jobs, and that the back-to-the-classroom appeals now being made by WMC are not very successful.

More Truck Competition

Heretofore, exclusively passenger car manufacturers are preparing to invade the truck field, in their expanded postwar plans. Hudson is readying a half-ton job of new design and Nash is also planning a line of trucks, principally light and medium.

Packard previously announced it would try to adapt one of its engines to the truck field. It was in that field before. If it does accomplish the engine job, it is expected to follow it up with a completed truck.

Ford truck output is being about doubled each month, and will be at its prewar normal by November.



VJ-Day Found Ford Best Prepared—When peace came only the Ford Motor Company had cars actually in production. On August 13, its Edgewater, N. J., plant rolled off the assembly line its first 1946 auto, duplicating the scene at the Rouge plant, shown here, which had taken place five weeks earlier. However, other producers are expected to follow Ford in a month or two.

Severe Unemployment May Push New Labor Legislation

Jobless estimates range from five to ten millions. Less optimistic than industry, labor wants higher pay, more unemployment compensation. No-strike pledge ended

NEW YORK—Sudden end of the Pacific war transformed the United States almost overnight from a nation with a relatively tight manpower situation into one whose rapidly rising unemployment figures were grim reminders of the human problem to be met in reconversion.

Cutbacks in aircraft, shipbuilding, and armament production prior to the end of July left 1,400,000 persons unemployed, and those cutbacks—based upon the reduced military needs of a one-ocean war—were only a drop in the bucket to contract cancellations which began within hours after the Japanese surrender took on official status.

What these new cutbacks—$23,500,000,000 in War Department cancellations and more than $6,000,000,000 by the Navy—would mean in terms of jobs lost and in unemployment, could not be known immediately.

5,000,000 Jobless?

Collis Stocking, an assistant director of the War Manpower Commission, said 3,500,000 persons might be cut off employment rolls in the first ten days after the end of the war. Added to the 1,400,000 already unemployed, this would bring the number of jobless to an approximate 5,000,000 before September.

His estimate, however, tallied with other figures from Washington. A report issued by Reconversion Chief John W. Snyder forecast loss of jobs for 4,000,000 war workers within two months after the end of hostilities.

There was similar agreement on longer term figures. WMC has predicted that 6,500,000 will lose jobs by mid-December and 7,500,000 by mid-1946; the Snyder report has set the total reduction in jobs at 8,000,000 by next Spring.

Reconversion Timing Varies

The war plants facing reconversion to consumer durable goods production will be hardest hit, because they face a more difficult and time-consuming problem of returning to peacetime production. Serious unemployment must be faced, for six months or more.

The material industries—producing such basic products as steel, copper, and lumber—can convert far more easily. There will be employment cuts, sharp for 60 to 90 days, then a trend back to full employment.

As far as the overall industrial picture is concerned, government planning is aimed at the return of full employment by the middle of 1947.

Some Areas Hard Hit

Largest reductions—and greatest problems—are faced by the cities in which war industries blossomed; Los Angeles and Detroit, with 120,000 workers due to leave war jobs in each; Buffalo, Chicago, Seattle, Kansas City, Baltimore, Hartford, Wichita, San Diego, Atlanta, Cincinnati, Dallas, Oklahoma City, Ft. Worth, Omaha, Dayton, Tulsa, and Flint. To meet the serious problems arising in each of these, and in other less-pressing trouble spots, the national manpower freeze—hiring and job-changing controls — was ended speedily. WMC and the United States Employment Service plan community job surveys and a coordinated program of channeling workers from locations with unemployed problems to still existing areas of tight labor needs.

Some Relief In Sight

Industrial workers from "trades and services" will be encouraged to go back to employment in stores, offices, filling stations, laundries, white collar occupations, and so forth.

The rechanneling cannot expect to make a big dent in the jobless; that, Snyder points out, depends upon speeded reconversion, "a steady rising standard of living," "stabilization of our economy to avoid disastrous inflation or deflation," and expansion of productive capacity.

Higher Wages Asked

Generally, labor is now centering its demands on immediate action by Congress on a "human reconversion" program which would: raise unemployment compensation to $25 a week maximum for 26 weeks, on a national basis; provide for a 65c minimum hourly wage instead of 40c an hour legal minimum; set up a federal full employment program which would, among other things, provide for extensive job-creating public works; adjust wages to prevent sharp reductions in take-home pay from downgrading, loss of overtime and incentive pay, and other adjustments to civilian production—a demand which will continue despite an easing wage policy just announced for the peace-doomed National War Labor Board, (allowing wage increases without the formality of NWLB approval if no price boost is involved, raises to adjust "maladjustments" or disparities between wage levels and living costs in the biggest knick yet made in the Little Steel formula.)

C.I.O. unions in the aircraft and automotive industries and others hardest hit by cutbacks are proposing government agencies—similar in nature to Tennessee Valley Authority—to prevent shutdowns of some $16,000,000,000 worth of government-owned war plants by federal operation or subsidized lease.

Congress is expected to heed some of labor's demands, but by no means all of them. Some action on unemployment insurance and social security is to be expected. The minimum wage bill and that for full employment—despite President Truman's support—will run into roughgoing.

Industry Plans Help

Industry itself has been quietly at work for some time on postwar planning. It remains the leading factor in volume and duration of unemployment. There are growing indications that pessimistic views of the length of time reconversion will require are far-fetched, and that the change from firing to hiring may come much sooner than foreseen. A National Asson. of Manufacturers' estimate sees only 1,500,000 jobless for more than 30 days, says most of these will be back at work in 12 weeks.

FORD BOOSTING EDGEWATER ASSEMBLIES

EDGEWATER, N. J.—From a starting rate of 15 passenger cars daily, the Edgewater plant of the Ford Motor Company expects to reach 25 daily by the end of August, and go even higher as materials ease. The plant has a peak capacity of 750 units daily, but this was probably seldom realized in the past.

Eventually, employment is expected to reach 4,000, as compared with the prewar peak of 3,000, and current employment of 2,000. Ford expects to establish a Mercury assembly plant in the New York metropolitan area, but the site has not yet been picked. Although desiring to locate within New York City limits, officials want water and rail connections, plus easy access by labor.

Washington Bulletin

WPB Leads Reconversion

Decision by the Office of War Mobilization and Reconversion to use the War Production Board and its chairman A. J. Krug as the instruments of transition to peace is regarded here as sound policy. Reasoning is that the Board (and its predecessor agencies) moved industry from peace into war, and that it has the know-how to move it back to peace again.

President Truman, on the advice of John W. Snyder, OWMR director, called upon Krug and his WPB to do the job. He recommended (1) a drive to expand production of materials not only for war but for civilian demands; (2) continued limitation of production from short materials to avoid pressure demand which might threaten stabilization; (3) effective control of inventories to avoid speculative hoarding and unbalanced distribution which could endanger stabilization; (4) priority assistance to break bottlenecks; (5) allocation of scarce materials to produce low-priced items, which otherwise would not be produced. Private business is to have every opportunity for initiative and ingenuity.

The office of contract settlement has had extensive experience in policy and procedure and it is ready for the deluge that falls upon it with peace. The general policy of payments and loans on the contractors' estimates, with any quibbling or litigation reserved for more leisurely times, is agreed to by all concerned.

Surplus Problems

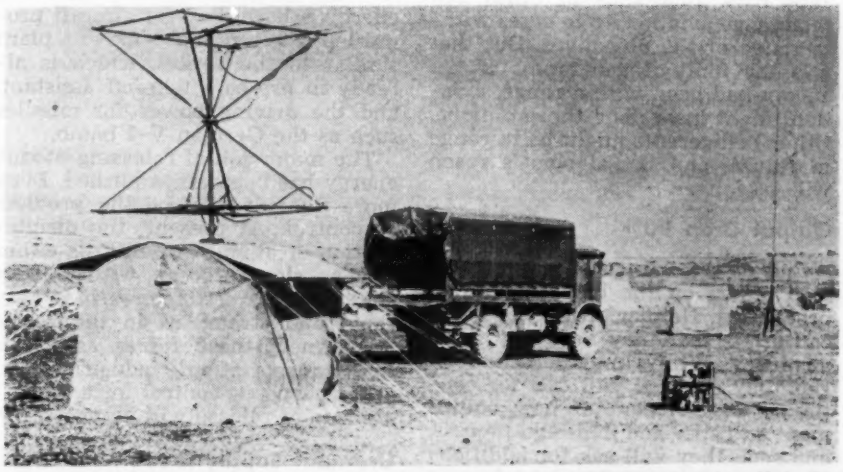
Surplus war property, if unwisely managed, can seriously slow the rehabilitation of production or it can cost the taxpayers too much if not sold at fair prices fairly promptly. The Surplus Property Board has been hampered by its position as a policy-making board, and its three-man top staff, under provisions of the Surplus Property Act. Truman has asked Congress to place the board under a single administrator, and changes have been proposed in the position of the Board itself in the over-all disposal action.

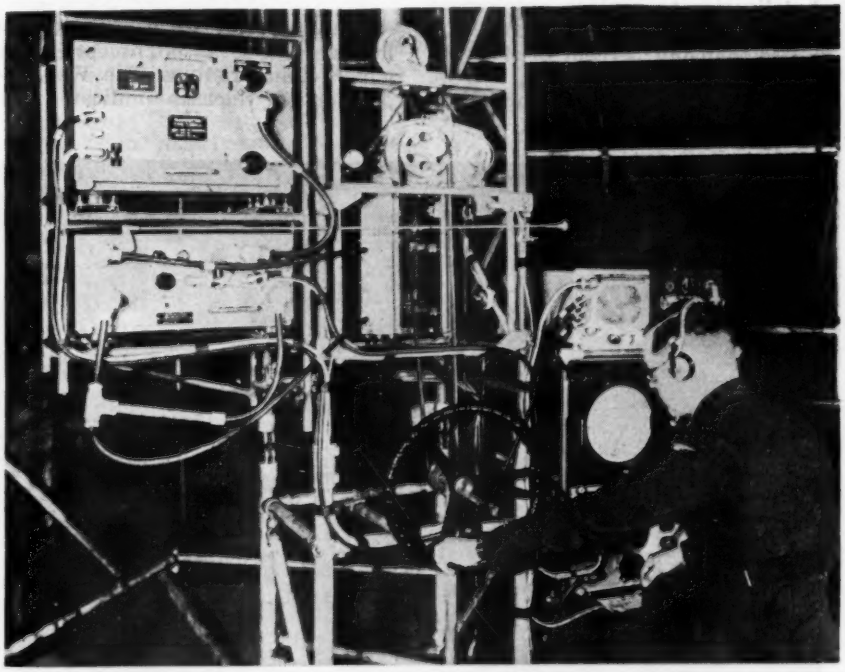
Nearly all the surplus items for sale domestically are duplicated on surplus shelves abroad. All surplus overseas are in charge of Army-Navy Liquidation Commissioner Thomas B. McCabe, who hasn't had the job long enough, or received enough surplus, to be in trouble yet. He says that saleable overseas surplus will be smaller than expected, yet he has 4,000,000 items in his catalog. These are his policies: get the most money back for the taxpayer; sell no goods where it might be used to disturb the peace; see that supplies sold abroad are not bounced back into our domestic market; make the sales boost our export markets if possible; avoid upsetting economic conditions in countries where surplus is located; decentralize operations so as to cut red-tape and act without delay.

War agency chiefs here are aware that industry will be very impatient of government controls and red-tape, and they are almost solicitous in their efforts to clear the way for private initiative—especially those who came from business.

Research Aided

Sponsors of legislation to set up an overall, government-owned scientific research organization for the benefit of defense and civilian life got a tremendous boost from the atomic bomb. Never before has the lay multitude had such a demonstration of what the cloistered professor can do. Passage of the Kilgore bill, or one like it, for a national research institution to replace the war-born Office of Scientific Research and Development, will be a walkaway. Research programs in schools, and in industry, will receive generous support.





Radar Helped Shorten the War—Development of radar by British scientists, not only saved London from the Luftwaffe, but aided American land and sea forces against enemy craft of all types. This newly released British photo of the interior and exterior of a light warning radar station indicates its mobility. Through radar, American ships could learn approach of enemy submarines, ships and planes

Spotting the Air News

Aviation's Credit Huge

Air power enthusiasts will proclaim that strategic aviation acting almost alone brought the Jap enemy down. It is a fact that the Empire was still largely intact, with Malaya, and large chunks of China and Asia and many Pacific islands still occupied, and still no allied forces had set foot on the enemy's mainland. What spoils the air power story this time, though, is the fact that the Army and Navy had to fight the Japs back thousands of miles and then move aviation up to bases within range of the objectives. But that was the fault of geography. If the enemy had been within range, aviation might have done the job alone. Other belligerents might be in range in future, and the airplane's reach will be longer.

Output Drop 90%

End of the war means immediate stop orders on the bulk of aircraft production. Neither Army nor Navy can argue that they need any more airplanes of any kind immediately. But they can and will call for continued development of new equipment on paper and in design process, and soon they will ask for additional deliveries to replace obsolescent types. The industry will drop back to less than ten percent of its wartime peak, which, however, will be much bigger than the prewar industry. Military and transport requirements will remain comparatively small. The drive is on to create a personal aircraft market.

Atomic Energy Effects

Of the many human endeavors that will be affected by the development of atomic energy, aviation is one of the foremost.

Best information available from the National Advisory Committee for Aeronautics and others qualified in basic research is that when this energy is harnessed for aircraft propulsion it will probably be in a plant similar to the rocket, which is already in use as a take-off assistant, and the driving power for missiles such as the German V-2 bomb.

The major job of releasing atomic energy has been accomplished. Even more difficult may be the problem of control. At present, the disintegration of atomic structure is either a very slow process, with a very slight release of force, or it is very rapid and strong, as in the bomb. To harness these forces as power for transportation, industrial and other purposes, control for a moderate rate of release will be necessary.

Uranium Supply Good

Uranium, the substance used so far, is a product of pitchblende, from which comes radium. The War Department's releases indicate that enormous quantities of this ore were shipped from Canada to the Manhattan Project plants in this country. The United States controls perhaps 80 percent of the world's pitchblende, which is probably enough for war purposes, but if peacetime developments are successful, a critical problem will be the supply of uranium.

It is possible the other elements can be radio-activated with unranium but that is only a vague promise. It is a fact also that the frequency and general effects of radio-activity from electronic tubes are about the same as those from pitchblende concentrates, but no authority seems to have spoken so far on the prospect for using electronics to break down atomic structures for the release of energy.

Atom Aids Aircraft

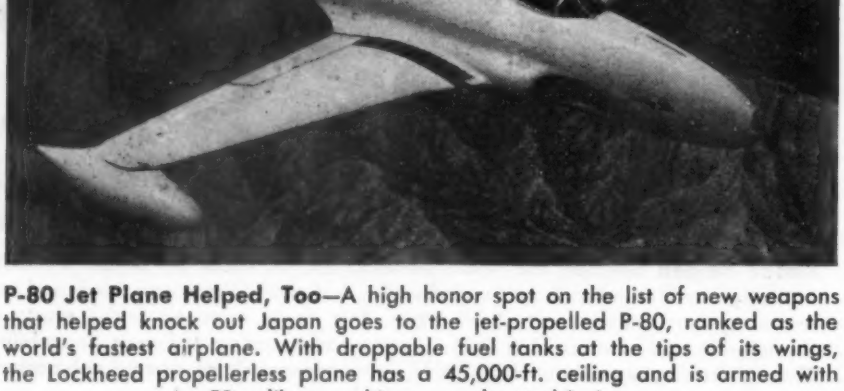
Early effects of this new departure in the study and control of nature on war and aviation seem reasonably predictable. It seems to give aircraft a decisive advantage over military surface operations. When the atomic bomb is brought to much greater strength than it has now, as indicated by the Army, it would seem that a superior air power could take care of any enemy without major operations by sea and land forces. This estimate is based on aviation with conventional and jet engines. If atomic engines were available, the near-limitless range, speed, and load capacity of aircraft would be even more self sufficient as a weapon.

On the other hand, if guided missiles, like the V-2 bomb, can be aimed more accurately, and if their range can be increased several thousand miles, they could carry atomic warheads, and the airplane, as it is today, might become a minor factor in warfare.

In fact, atomic power conceivably could obsolete the winged airplane for long-range commercial as well as military flight. As speed increases, wings become smaller and smaller until in time they might disappear, lift force being applied directly to the body of the machine as a component of the driving force.

LT. GEN. CAMPBELL JOINS RECONVERSION STAFF

WASHINGTON—At the request of Reconversion Director John W. Snyder, Army Ordnance Chief Lt. Gen. Levin H. Campbell, Jr., has been assigned to the Office of Reconversion to help "speed up contract termination, plant clearance, and the release of war plants to peacetime output."



P-80 Jet Plane Helped, Too—A high honor spot on the list of new weapons that helped knock out Japan goes to the jet-propelled P-80, ranked as the world's fastest airplane. With droppable fuel tanks at the tips of its wings, the Lockheed propellerless plane has a 45,000-ft. ceiling and is armed with six .50 calibre machine guns, located in its nose

VJ-Day May Ease Flat-Rolled Situation; Canadian Surplus

MONTREAL—VJ-Day may bring some easing in sheet steel demand, which has been reported to be double current output. Biggest worry at the moment is that the United States may not be able to supply the 30,000 tons of hot- and cold-rolled sheet which is the minimum demand of Canada from the United States for the fourth quarter.

Production by the Steel Co. of Canada's new mill is scheduled to begin late in November, with indications that early 1946 will see the plant producing about 30,000 tons a month. Output at the mill will be used chiefly for galvanized sheets, but this will not ease the demand for cold-rolled steel used in various peacetime products such as cars, refrigerators, etc. However, it is hoped that the broad cancellation of remaining military orders should release sufficient supplies of steel for most of Canada's modest civilian requirements for the fourth quarter.

All controls over the purchase and use of stainless steels have been removed.

Surplus Difficulties

In 1944, the War Assets Corp., government disposal agency for surplus products, sold a total of $10,000,000 of merchandise which included everything from ships to clothing. This year sales will be four times as much.

Surplus goods are disposed of in whichever territory they become surplus, excepting when supplies are large enough to warrant national distribution. Merchandise is handled through the trade, sold through larger stores, and also offered to the public direct. Methods of sale depends on goods, quantity and locality. For example, on aircraft, industrial equipment and ships, the public may deal directly with the War Assets Corporation. In the case of industrial equipment owned by the government and installed in a private plant, the plant owner has first call on buying said equipment.

When surpluses are greater than demand and there is a danger of flooding the market, the War Assets Corp. will hold back a reasonable quantity of goods until such time as unloading will not interfere with the stability of the country, say Government officials. Typical of the jobs facing disposal officials is Canada's fighting Navy. Almost 100 of her corvettes are today rusting in a bay of the St. Lawrence, stripped of worthwhile gear and awaiting a buyer or sinking. Ridiculous offers have been made to the government for these ships, but have been refused. Unless the ships are disposed of within a reasonable time, they will be sunk, says Ottawa.

Names in the News

H. B. Kraut

H. B. Kraut has resigned as president and general manager of the Giddings and Lewis Machine Tool Co., Fond du Lac, Wis., because of ill health. He was appointed chairman of the board of directors, a newly created position, while his son, **Lieut. Col. Ralph J. Kraut** was elected to succeed him.

C. C. Fish has been elected president of the Shelby Metal Products Co., Shelby, Ohio, succeeding the late **W. W. Van Horn.**

Henry F. Dever has been elected president of the Brown Instrument Co., wholly owned subsidiary of the Minneapolis-Honeywell Regulator Co., Philadelphia, Pa. Mr. Dever, who has been serving as vice president in charge of engineering for Minneapolis-Honeywell, succeeds **Charles B. Sweatt** as president of Brown.

W. F. Elder and **Elmer H. Jaeger** have become associated with Marshall & Huschart Machinery Co., Chicago, Ill. Mr. Elder, formerly in the Master Mechanics Division at the Dodge Chicago Plant of the Chrysler Corp., is associated with the sales department, and Mr. Jaeger, formerly with the Caterpillar Tractor Co., Peoria, Ill., will cover the Rockford territory.

Elliott L. Jones has been appointed purchasing agent of the Swanson Machine Co., Jamestown, N. Y., succeeding **John Leonard,** resigned.

J. J. Kraus has been appointed sales vice-president of Detroit Seamless Steel Tubes Co., Detroit, Mich. Released from active military service in July after 3 years in service, Mr. Kraus was lately stationed as a major with the Washington office, Chief of Ordnance.

Harry A. Mack has been appointed regional manager of the Ford Motor Co., Dearborn, Mich., with headquarters at Dallas, Tex.

Dr. Sanford A. Moss, consulting engineer with the General Electric company's Lynn, Mass., River Works, and pioneer in aircraft superchargers and turbosuperchargers, has been awarded tthe Holley Medal for 1945 by the American Society of Mechanical Engineers.

N. A. Pedersen has been named president and general manager of the C. B. Hunt & Son Co., Inc., Salem, Ohio, succeeding **Nathan C. Hunt. S. C. Chessman,** chief engineer since 1933, has been elected vice president.

Dr. J. T. Rettaliata, manager of research and gas turbine development for Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has been named chairman of the mechanical engineering department at Illinois Institute of Technology.

Franklin A. Reed, appointed sales manager of the Niagara Machine and Tool Works of Buffalo, N. Y., succeeds **George R. Kinney,** resigned.

Earl A. Taylor of Detroit, Mich., has been made general works manager of the automotive division of The Crosley Corp., Cincinnati, Ohio.

R. K. Carson

L. R. Clowes

Ralph K. Carson has been made sales engineer at the Detroit, Mich., branch of the Heppenstall Co., Pittsburgh, Pa. He has been associated for several years with the engineering department of the Kelsey-Hayes Wheel Co., Detroit, Mich.

Lloyd R. Clowes, Pittsburgh district sales manager of Firth-Sterling Steel Co., McKeesport, Pa., was recently made assistant general sales manager of the company.

O. C. Schmitt

R. W. Hubbard

Oscar C. Schmitt was elected president of The Emerson Electric Manufacturing Co., St. Louis, Mo., to succeed **W. Stuart Symington.**

R. W. Hubbard has been appointed export product manager of the export division of The Crosley Corp., Cincinnati, Ohio. He has been associated with the company since 1927.

Glenn Sayther, associated since 1929 with the Minneapolis Branch of the Ahlberg Bearing Co., of Chicago, Ill., in sales and service capacities, has moved up to take the place of **Ray F. Landis** who retired from the post of manager of the branch on July 1.

Edward Van der Pyl has been appointed superintendent of the Norbide Plant by Norton Co., Worcester, Mass.

Col. Joseph P. Woodlock has been elected executive vice president of Rochester Ropes, Inc., Jamaica, N. Y. He comes to the company from the Reconstruction Finance Corp., where he has been associate director of the Office of Surplus Property. Executive officer under **W. L. Clayton** in the Surplus War Property Administration, Col. Woodlock was detailed from the Army to that assignment by Lt. Gen. Lucius D. Clay.

Foster R. Woodward has joined the staff of Progressive Welder Co., Detroit, Mich., as welding application engineer.

BUSINESS ITEMS

The Cleveland Pneumatic Tool Co., Cleveland, Ohio, has formed a railway division with eastern headquarters at 50 Church St., New York. **John N. Thorp** will be the new division's representative.

The Frederick Iron & Steel Co., Frederick, Md., has been sold to a Cincinnati, Ohio, Syndicate headed by **Sidney G. Rose, Philip Moskowiz,** and **Meyer Goldberg** of the **Plant & Equipment Purchasing Co.,** in a transaction involving more than $808,000. The concern will continue operations under its present name.

F. L. Jacobs Co., Detroit, Mich., has acquired a plant at Dowagiac, Mich., which will be used for production of an automatic washing machine. The plant has 110,000 square feet of floor space.

Henry E. MacArthur has been appointed as manager of the manufacturing and repair department, Westinghouse Electric Corp., at Huntington, W. Va.

Moore Products Co., Philadelphia, Pa., has opened a branch office for Michigan, Southern Ontario, and Northern Ohio in the Penobscot Building, Detroit.

Stow Manufacturing Co., Binghamton, N. Y., has opened a branch office in Chicago, Ill., at 308 W. Washington Ave., to be headed by **Ralph E. Wimmer.**

Talon, Inc., Meadville, Pa., has sold its Aero Products Division, composed of two departments engaged in the manufacture of fibre self-locking stop nuts and cowling fasteners known as **Lion Fasteners, Inc.** Officers of the new company, which will go under the name **Lion Fasteners, Inc.,** are: **Saul S. Frankel,** president; **G. S. McKee,** vice president; **H. W. Hayes,** treasurer; **Harry D. Goldman,** secretary. The new owners will concentrate on the development of the Lion Cowl Fastener.

Ward Dougherty

W. W. Gleason

The Osborn Manufacturing Co., Cleveland, Ohio, has established an export department in its machine division. **Ward Dougherty** has been named as export manager.

S. G. S. Spring Clutch Corp., Indianapolis, Ind., a wholly owned subsidiary of **Curtiss-Wright Corp.,** has revealed an expansion program which includes purchase of the three-story Mars Hill plant in Indianapolis operated at present by the Allison Division of **General Motors. W. W. Gleason** was elected president of the spring clutch firm.

Tate-Jones and Company, Inc., has transferred the company's executive, engineering, and sales offices from Leetsdale to the Plaza building, Pittsburgh, Pa. The plant will be moved from Leetsdale to Beaver Falls.

The Vulcanized Rubber Co., of New York City and Morrisville, Pa., has changed its name to **Vulcanized Rubber and Plastics Co.,** due to the expansion of the plastics division of the company.

Westinghouse Electric Corp., Pittsburgh, Pa., has acquired the **B. F. Sturtevant Co.,** of Boston, Mass., the pioneer in the design and manufacture of air handling and processing equipment, to be operated as a division of the corporation.

The Wheel Trueing Tool Co., Detroit, Mich., has acquired **The Adamant Tool Co.,** of Bloomfield, N. J., to be known under its new ownership as the **Adamant Tool Co., Eastern Division of Wheel Trueing Tool Co.**

OBITUARIES

F. Archer Thompson, 62, head of the Detroit office of the Bullard Co., Bridgeport, Conn., died July 31. Head of the firm's standards department, Mr. Thompson had been associated with the Bullard Co. since 1912.

J. Russell Garrison, president and general manager of the Garrison Machine Works, Inc., Dayton, Ohio, died suddenly July 18 at his Dayton home. Associated with the Garrison Gear Grinder Co., Mr. Garrison had much to do with the development of the Garrison Gear Tooth Grinder. Many patents on pitch line control gear chucks were also issued to him.

William D. Clement, inventor, manufacturer, and owner of the W. D. Clement Lathe Works in Waltham, Mass., passed away of a heart attack on June sixth.

MEETINGS

The Annual Meeting of the American Welding Society usually held during October of each year will not be held this year because of wartime travel. National officers, the board of directors and committee chairman will meet on October 18 at the Hotel Pennsylvania to deal with matters which require official action.

Shop Equipment News

Bu-X-ite Treatment for Abrasives Abrades with Diamond Efficiency

A method of producing an isotropic vitrescent carbonaceous material and applying it to grains used in the manufacture of grinding wheels, or to finished wheels, has been devised by the Connecticut Research Foundation, Stratford, Conn. The carbon is produced by electro-chemical action and applied, as a colloidal suspension in a volatile carrier, to the grains or finished abrasive products. This treatment coats the individual grains with isotropic carbons having a thickness of one to three microns and being supported by the grains.

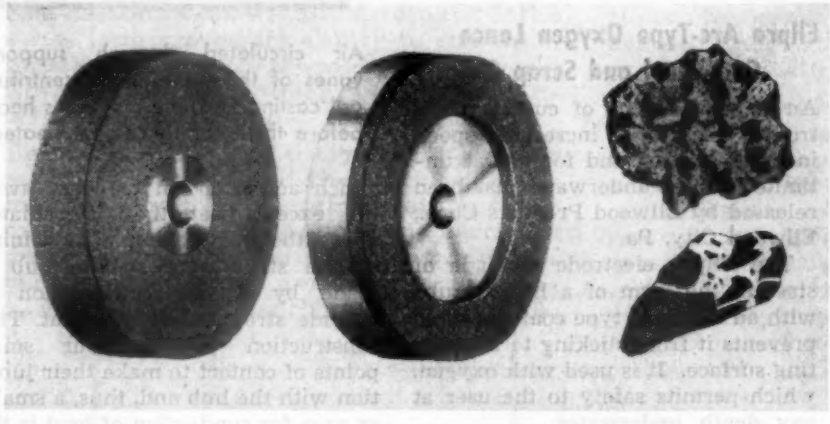
Impact pressures and temperature increase, resultants of grinding action, change the structure and characteristics of the isotropic carbon to those of absolute carbon evident in the form of diamonds. Thus, each individual grain with an exposed cutting edge acquires a shell of exceptional hardness. The hard shell of carbon deposited on each individual grain, although of microscopic thickness, imparts to the structure the cutting characteristics evident in a full diamond particle.

The treatment, designated as Bu-X-Ite treatment, when applied to completed wheels provides full penetration of the carbonaceous material to the core of the wheel. As the wheel bonding material breaks down, a new supply of hard-cased grains is exposed at the surface.

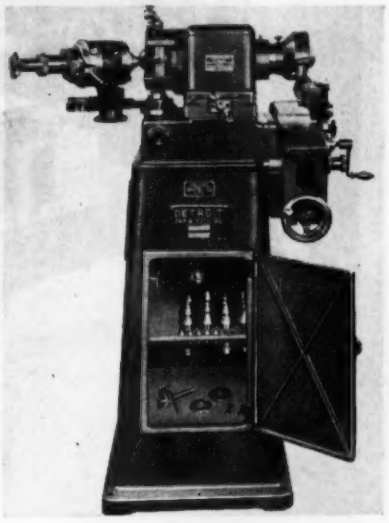
One test of the treatment involved a wheel made of common beach sand. When treated with Bu-X-Ite, this wheel, which under ordinary circumstances would disintegrate, achieved the cutting characteristics usually ascribed to one of the aluminum oxide type.

When applied to aluminum oxide wheels, the cutting characteristics are raised to an extent that permits tungsten carbide to be cut with the ease of mild steel, and Norbide, previously known as not grindable, can be ground successfully.

This treatment, at present, is available in products manufactured by the Bridgeport Safety Emery Wheel Co., Bridgeport, Conn., or it may be applied to abrasive materials shipped to the plant.



BU-X-Ite treatment of abrasive products encases each abrasive grain in a shell of isotropic vitrescent carbon. This casing is changed, under the heat and pressure of grinding, to a form of material that performs its cutting action as diamond. The function of the grain is reduced to supporting the carbon in proper grit sizes and supplying bulk and impact resistance to the abrasive mass



The grinding wheel spindle-head of the Detroit tap reconditioner is adjustable to compensate for tool wear

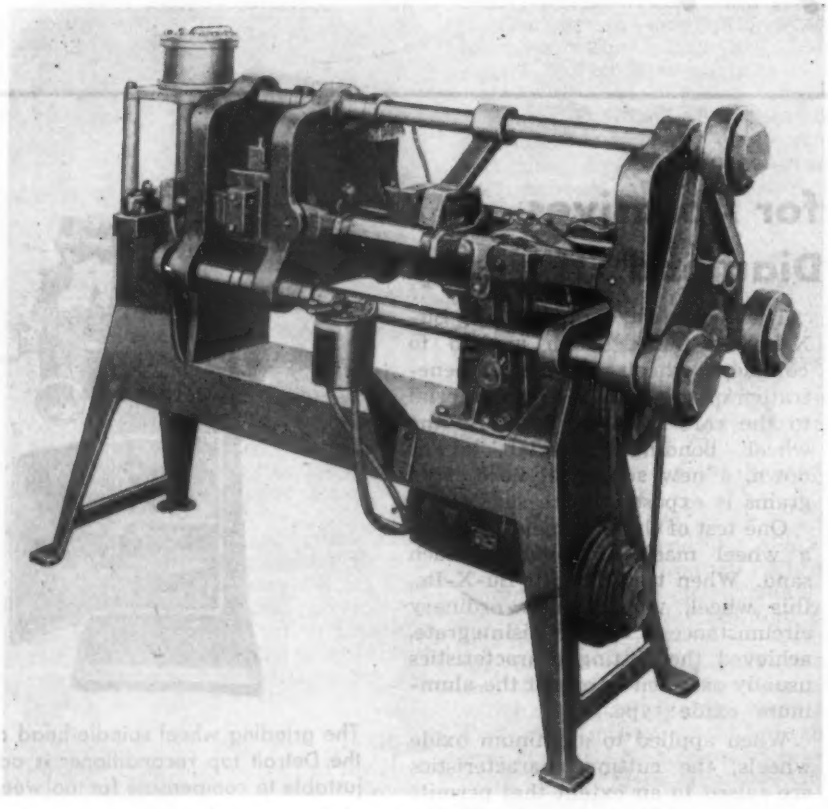
Detroit Tap Reconditioner Improved to Extend Capacity

An expanded range of capacities enabling the reconditioning of taps from small machine screw sizes up to 1-½ in. dia has been built into the tap reconditioner produced by Detroit Tap & Tool Co., 8432 Butler, Detroit 11, Mich.

All operations for keeping taps in condition can be performed on the reconditioner as it has facilities for full-range chamfering, spiral pointing, point polishing and grinding the full length of tap flutes. Taps of from 2 to 7 flutes can be chamfered on the machine, and flutes and spiral points can be ground on taps having from 2 to 6 flutes. All taps can be point polished.

Provision of a high precision spindle head permits a range of motor types for the various service voltages, frequencies, and phases encountered in plants. High rigidity of spindle head and continuous adjustability for grinding tool wear is provided by mounting the spindle assembly on large dove-tail ways in the pedestal base. A compartment in the machine's base affords storage room for the quick-change type interchangeable collet chuck.

Light Metal Die Casting Machine Equipped with Automatic Cycling



The high speed cycle of the Light Metal die casting machine gives production rates approaching those of multiple cavity procedures

A die casting machine for the production of small zinc, tin and lead alloys, is built by Light Metal Machinery, Inc., 607 Ariel, Erie, Pennsylvania. Its casting cycle is completely automatic, with die movement, injection and ejection all actuated by one mechanism.

It has four operating speeds—266, 400, 639 and 882 shots per hour—predetermined by the size and weight of the casting being made. Because of the high cycling speeds, castings can be made in a single cavity die at production rates equal to those of large machines.

Small, light-weight dies are easily installed and removed, reducing die-change time. The pressure pot assembly can be removed and replaced in 15 to 20 min. The injection plunger and cylinder assembly will last for a minimum of 300,000 shots before regrinding.

The machine can be operated in a space of 100 sq. ft. It operates with either air or hyraulic pressure on the injection plunger. On the standard model, the plunger diameter is 2 in., its stroke is 4 in. shot capacity is 18 ounces, casting area is 30 sq. in., and injection pressure is 1000 lb. per sq. in. if an air cylinder is used, or 2000 lb. per sq. in. with a hydraulic cylinder. Other plunger sizes are available.

The machine is 6 ft. long, 21 in. wide, 4 ft. 6 in. high, and weighs 3000 lb.

Ellpro Arc-Type Oxygen Lance Cuts Steel and Scrap Quickly

An improved type of cutting electrode, permitting increased speed in metal cutting and for use at unlimited depths underwater, has been released by Ellwood Products Corp., Ellwood City, Pa.

The Ellpro electrode is made of steel in the form of a hollow tube with an adhesive type coating which prevents it from sticking to the cutting surface. It is used with oxygen, which permits safety to the user at any depth underwater.

The adhesive coating was developed through research and testing with the U.S. Naval Engineering Experiment Station at Annapolis and the Minnesota Mining and Manufacturing Company.

Speed of operation is a major advantage of the electrode; a molten arc is obtained the instant it is placed against the surface to be cut. It can be used successfully underwater or anywhere on land, with either a.c. or d.c. current. A torch holder, perfected for use with the electrode, prevents it from burning down to a point where it cannot be removed with ease.

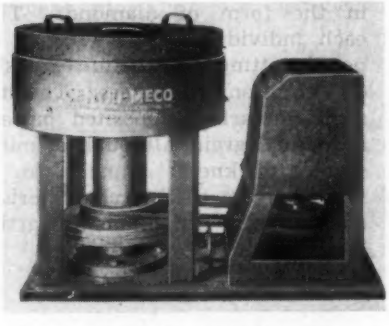
Although the electrode was designed primarily for underwater cutting, it is adapted to cutting scrap iron or steel, salvaging sunken marine equipment and rehabilitation work.

Centri-Meco Casting Machine Holds Hub Temperature Lower

A Centri-Meco centrifugal casting machine with a heat-protected hub is announced by the Centrifugal Machine and Engineering Co., 637 Jackson Court, Kalamazoo 7, Mich.

This centrifugal casting machine has been designed to be heat-free in the bearing area, during continuous use of the machine with permanent molds attached directly to the heavy table mounting-plate. The hub is so constructed that the temperature in the bearing area never exceeds 125F.

The table has four strut-vanes



Air circulated through support vanes of the Centri-Meco centrifugal casting machine dissipates heat before the bearing can be heated

which act as a fan to carry away the excess heat that is radiated above the top bearing. The joining of the strut-vanes to the hub is made by welded construction to provide strength at this point. This construction permits four small points of contact to make their junction with the hub and, thus, a smaller area for conduction of heat is the result. Strut-vane construction also adds greater strength against any table distortion.

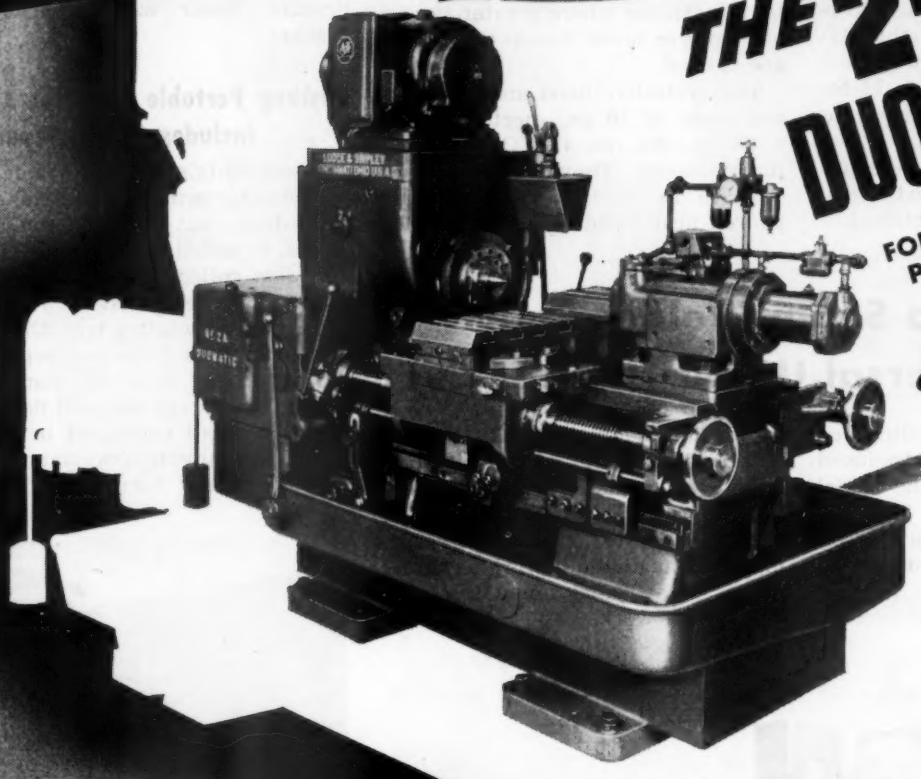
The machine is mounted on heavy plates for anchoring to the floor. The hub is turned of 6¾ in. me-

NEWEST ADDITION TO THE LODGE & SHIPLEY LINE

THE 2-A DUOMATIC

FOR FASTER, BETTER PRODUCTION OF

SMALL JOBS



FULLY AUTOMATIC
with all the features
of the bigger 3-A

Now, whether your jobs are large or small DO IT WITH A DUOMATIC! The 3A Duomatic—a full automatic lathe—has long proved its ability to cut time, increase output on a wide range of work. Now, Lodge & Shipley introduces another automatic lathe—the new 2A.

The 2A Duomatic is designed for smaller jobs, yet it retains all the features of the big, powerful 3A. Operations are entirely mechanical. Dual tool slides and carriages permit any combination of turning and facing cycles—front and rear, simultaneously or independently. As on the 3A, front or rear cross slides swivel to any angle for a wide variety of facing operations. No cams are required to change cycles. Easy adjustments permit fast, accurate handling of large or small runs.

Like two lathes in one, this new automatic may easily replace several of your older, work-worn machines. It's another example of Lodge & Shipley leadership in lathe design—made possible through 52 years of specialized lathe experience. For details on the new 2A Duomatic write on your company letterhead.

THE LODGE & SHIPLEY MACHINE TOOL CO.

CINCINNATI, OHIO, U. S. A.

MACHINE TOOL DIVISION • 3055 COLERAIN AVENUE

SPECIAL PRODUCTS DIVISION • 800 EVANS STREET

L & S LATHES

chanical tubing of ¾ in. wall. The table mounting-plate is 18 in. diameter and the plate base is 20 × 42 in. Two anti-friction bearings are employed in the hub construction. Double V-belts are used to drive the table. Motor mounting is made of 2 × 2½ in. angle. It is adjustable into standard belt lengths permitting minimum to maximum obtainable machine speeds. Motor is adjustable up and down for alignment of sheaves.

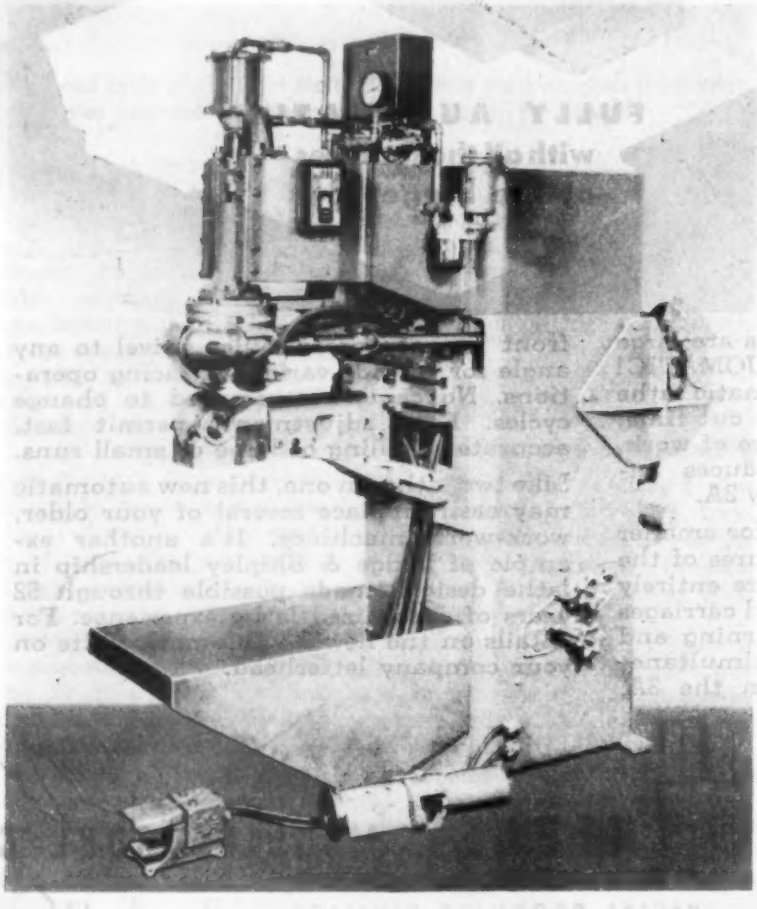
Two-speed Centri-Meco centrifugal casting machines and variable-speed drives are obtainable. Equipped with mechanical drives, infinitely variable speeds are provided from 198 to 1290 r.p.m. with a 2 hp. motor, or, with 3 hp., an increased range of variable speeds from 301 to 1959 r.p.m. Electronic drives may be installed on custom-built machines where greater ranges of higher or lower speeds than these are needed.

The protective hood and spill pan are made of 10 ga. sheet metal in a 25 in. dia. on the Centri-Meco junior model. They telescope from 8 to 15 in. so that metal can be poured near mold height.

Thomson-Gibb Seam Welder Built With Universal Upper Head Swivel

Thomson-Gibb Electric Welding Co., Lynn, Massachusetts, has introduced a seam welder, known as the Model 6, for work ranging from 30 to 18 ga. mild steel in two thicknesses. Production speeds range up to 20 ft. per min.

It may be employed for circular or for longitudinal welds, or as a universal machine with swiveling upper head and interchangeable lower arm for rapid conversion from circular to longitudinal seaming. It is available in various throat depths and transformer capacities to suit the work.



Electronic current timing control on the Thomson-Gibb seam welder permits a range of work and assures uniform production of welds

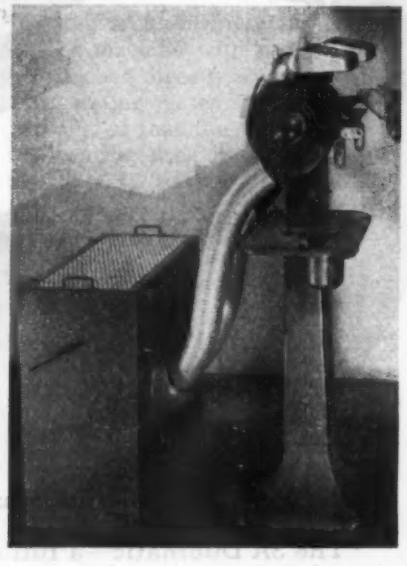
The welding wheels may be gear or knurl driven and the drive may be applied to either the upper, lower, or both wheels.

Separate water cooling circuits are provided for the transformer, upper welding shaft, head, lead bracket, lower welding arm and bracket.

Dustkop Portable Collector Includes Cyclon Separator

A self-contained and portable dust collector for grinders, sanders, abrasive discs, cut-offs and polishing lathes, is added to its line of Dustkop dust collectors by Aget-Detroit Co., Ann Arbor, Mich.

Of the recirculating type, the Model 420 features a cyclone separator, motor driven multiple blade fan, large dust storage bin, and flat, spun glass filter, all contained in a fire-safe unit. Advantages claimed for this design are: Increased efficiency



Access to the motor of portable Dustkop for oiling or other inspection is at the back of the machine

resulting from the use of a cyclone separator to separate out of the air stream the majority of dust and dirt; a larger dust storage compartment and flat type spun glass filter that can be shaken down as required. Renewal of filter material can be accomplished in a few seconds.

Dust and dirt drawn in from the source first enter the cyclone separator where most of the dirt is removed; the flat filter, which comprises the entire top of the Dustkop, removes the balance of the dust and dirt, returning the cleaned air to the working space.

Measuring 12 x 22 x 24 in. it can

The Machine that's **NEVER BEEN LICKED**

For either spur or helical gears, where day in and day out output really counts, where cost per piece is important, where accuracies *must* be maintained over long runs, even "Michigan" itself has not been able to "lick" the rack type gear finishing machine. The best we have been able to do is improve the machine for even greater accuracy in production, greater flexibility, better ease of adjustment and faster operation.

Fundamentally however, the Series 900 Michigan gear shaver operates on the same principle—generating gears from a basic rack—that it did when it first revolutionized gear manufacturing methods. This most accurate of generating methods permits the production of accurate gears by the millions at a *lower* cost than for less accurate gears.

Designed for mass production of spur or helical gears, splines, etc. ranging up to 8 inch diameter and 2 inch face width.

MICHIGAN TOOL COMPANY

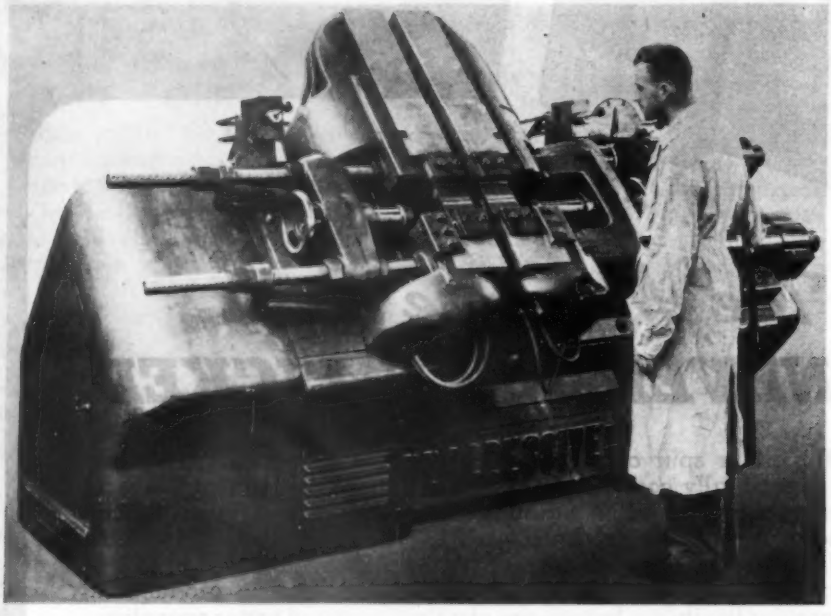
7171 E. McNICHOLS ROAD • DETROIT 12, U. S. A.

be placed in limited space behind a grinder or beside it. Installation requires no tools and is usually a matter of slipping the flexible metal hose (usually 3-in. dia. for double-wheel grinders up to 6-in. dia.) onto the inlet sleeves of the dust collector and connecting the hose to the dust outlet of the grinder.

The dust storage compartment is the size of the entire base of the machine. Emptying is required infrequently on average reasonably heavy duty use. The plate on the front of the Model 420 is removed to empty the collected dust.

Power to provide the suction (which is rated at 420 cu.ft. per min. with a 1 in. static suction in a 5 in. pipe) is supplied by a multiple blade fan driven by a ¼ h.p. continuous duty 3450 r.p.m. motor, the latter being available to suit any 60 cycle power supply.

Progressive Butt-Flash Welders Provide for Multiple Power Operation



Progressive flash welding machines are designed with large, T-slotted platens, either horizontally or angularly mounted, to accommodate standardized or special purpose dies for handling any size or shape of work piece within the capacity of each machine

Development of a line of butt-flash welding machines in five standard sizes embodying features to provide maximum flexibility of application, ease of maintenance and operation has been announced by Progressive Welder Company, 3050 E. Outer Drive, Detroit 12, Michigan. The machines range in electrical capacities from 20 to 250 kva. The five basic sizes, which comprise this range, are classified and rated according to recommended specifications of the Resistance Welder Manufacturers Association.

The design of these machines permits them to be furnished for hand, air, hydraulic or motor operation, as desired. Also, work clamping fixtures can be operated by one method and platen traverse by the same or another method. Thus, work clamping can be air operated and the flash and upset can be hydraulically operated on the same machine without change in the basic design of the machine. According to the nature of the work to be done, a machine may be manually controlled, semi-automatic or fully automatic.

One feature of the line of flash welders is the full hydraulic operation through a single hydraulic unit available on the larger models. In these, the unit is mounted within the frame of the machine and can be removed without disassembly for inspection or service. It contains three pumps:—(1) a rotor blade pump for platen traverse; (2) a gear type pump for clamping the work to the electrodes; and (3) a piston pump to furnish pressure for the upset action. The last mentioned actuates a direct acting traverse feed piston and eliminates mechanical linkage to furnish pressure for upsetting work pieces. Adjustments required by the hydraulic system are simplified, reducing set-up and change over time. Drive of the pumps through Cone-Drive gears assures maximum power utilization through a compact unit. This compactness also permits mounting the hydraulic unit inside the frame, thereby eliminating external piping and reducing the floor space required to a minimum.

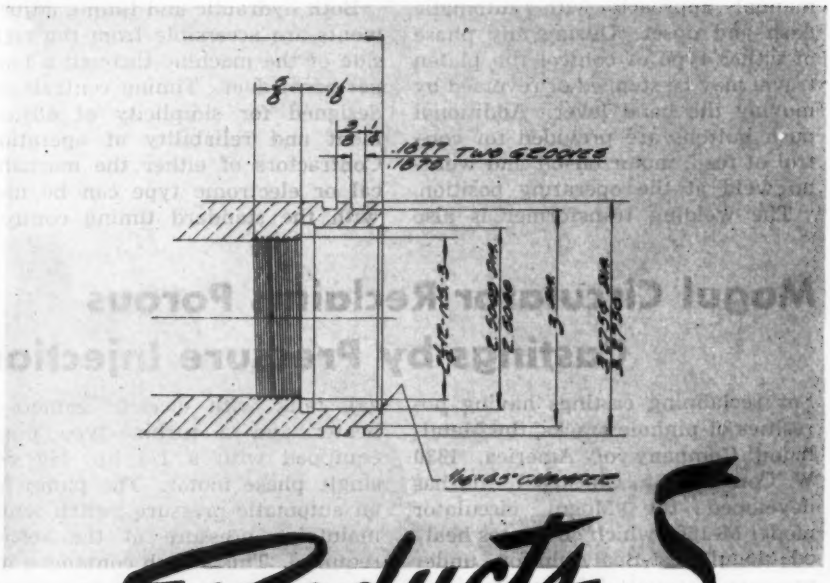
Another feature of the machines is the use of large, flat T-slotted platens designed to accommodate a wide range of interchangeable standardized or special dies for holding any size or shape work piece within the capacity of the machine. Hand wheels, engaging screws mounted in C-frame back-up plates, provide quick adjustment for work length on both stationary and moveable platens. The three larger machines are available with platens mounted in either the standard horizontal position or mounted at an angle of 45 deg. The latter are suitable where maximum ease of loading and unloading is desired. Another feature of the platens is that they are mounted on heavy steel rails and slide on anti-friction electrically insulated bearings of erosion-resisting material. The bearings are located outside the flash zone for extra protection.

The design and construction of the flash welding machines enables the mounting of special horizontal and vertical acting clamping fixtures and tooling to allow for wide variations in sizes and shapes of work encountered in the field—which may be welded interchangeably on these standard machines. All clamping fixtures are adjustable in two planes, permitting universal alignment.

Use of a single hand lever, with a push button for control of welding current mounted at its tip, enables the operator to control all stages of the welding cycle from one position. The rate of platen travel follows the movement of the hand lever in both forward and reverse directions, and both this rate and the position of the platen are indicated on a large calibrated dial opposite the operator.

Manual control of flash and upset operations is by movement of the hand lever to the left and pressing the push button to initiate and maintain the welding current. Upset pressure is applied during the latter part of the lever travel by preset cam action. Return of plate after

Better Gages



MAKE POSSIBLE

Better Products

EVERY advancement made in precision manufacturing has followed or coincided with an improvement in gaging methods. Extremely close tolerances have been made possible in production only because gages were produced to provide the required inspection accuracy.

Lincoln Park's development and use of Carboloy for gages has made it possible for hundreds of concerns to produce parts to much closer limits than would ever have been considered practical a few years ago. In Lincoln Park Carboloy gages, wear allowance is not necessary. At no time are they "over-size" but are accurate to required limits from the first inspection. They provide the precision which is so essential when a slight variance from accurate gage limits could mean the rejection of many parts that actually should be accepted.

The trend toward even greater precision in manufacturing operations will definitely continue into the post-war years. If you are to remain competitive in your markets, you too, will be producing better products to new standards of accuracy. And, as always, better products will call for better gages such as are now being made—and will continue to be made—at Lincoln Park.

ARMY E NAVY

LINCOLN PARK INDUSTRIES, INC.

Successor to The Lincoln Park Tool and Gage Company and Carbur, Inc.

1721 FERRIS AVENUE • LINCOLN PARK 25, MICHIGAN

welding is accomplished by moving the hand lever to the right.

Full automatic control is initiated by pressing the platen traverse button. The machine then carries through the approach, flash and upset, and return cycle.

Semi-automatic control provides manual approach with automatic flash and upset. During any phase of either type of control the platen travel may be stopped or reversed by moving the hand lever. Additional push buttons are provided for control of feed, motor on-off and weld-no weld at the operating position.

The welding transformer is also mounted within the machine. An eight point current regulator mounted on the transformer provides adjustment of welding voltage from approximately 50 to 100 percent of maximum. Transformer, secondary leads and die holders are water cooled.

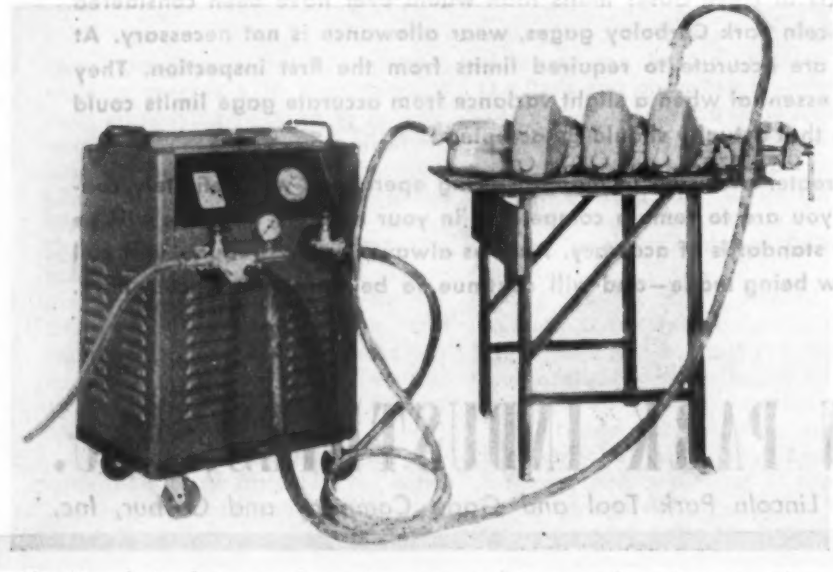
Both hydraulic and timing adjustments are accessible from the right side of the machine through a tamper-proof door. Timing controls are designed for simplicity of adjustment and reliability of operation. Contractors of either the mechanical or electronic type can be used with the standard timing controls.

Mogul Circulator Reclaims Porous Castings by Pressure Injection

For reclaiming castings having porosities of pinhole cracks, the Metallizing Company of America, 1330 W. Congress St., Chicago 7, Ill., has developed the Mogul circulator model M-1500 which circulates heated Mogul Cast-Seal solution, under pressure, through defective castings. The Mogul solution enters the crack at its maximum opening and, by the colloidal action of its base, builds-up in successive, interlocking layers until a bond which will seal the opening has been formed.

Under pressures as high as 200 lb. per sq. in. reclaimed castings were tested with hot kerosene, hot oil, hot water and other solutions and showed no porosity or leakage.

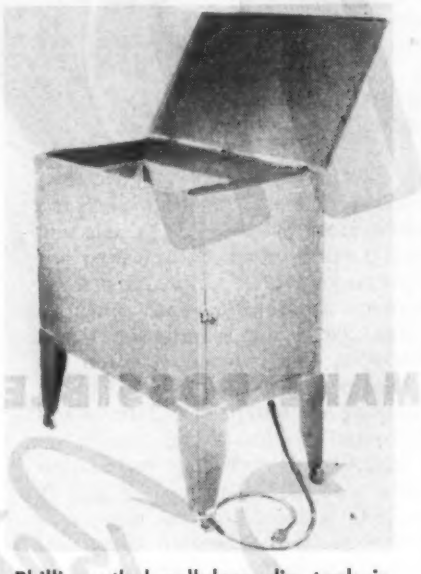
The Mogul circulator model M-1500 is mounted on rollers and consists of a cabinet housing one 15 gal. tank with electric immersion heater and a turbine-type pump equipped with a 1/3 hp. 110 volt single phase motor. The pump has an automatic pressure switch which maintains pressure at the setting required. This switch contains a device sensitive to changes in pressure which controls the speed of the pumping action. The immersion heater and the motor are protected from over-heating by automatic thermal switch. Twelve ft. of heavy-duty electrical cable for heater and motor and two 12-ft. lengths of heavy-duty safety hose for attachment to the casting are furnished with the unit. The circulator is furnished with air pressure gauge, air control petcock and 12 ft. of air hose fitted with quick-acting connector for pressure testing.



The Mogul circulator can be series-connected to several castings to reduce change-time and facilitate inspection of large batches

Phillips Plastic Dip Tank Holds Temperature Closely

The Phillips Manufacturing Company, 3408 Touhy Av., Chicago 45, Ill., manufactures a melting tank for ethyl cellulose dip compounds that maintains critical melt with a temperature variation of less than 5 deg. F. This unit has a capacity of 15 gal. of melted ethyl cellulose or similar compounds. Melting tank



Phillips ethyl cellulose dip tank is equipped with thermostatic controls to maintain pre-set temperatures

is encased in an oil bath by which heat is transmitted throughout the melt uniformly by convection. Thermostatic controls keep the melt at the temperature desired and there is a screened off section for adding additional ethyl cellulose so that it does not enter the melt until it is of the right consistency.

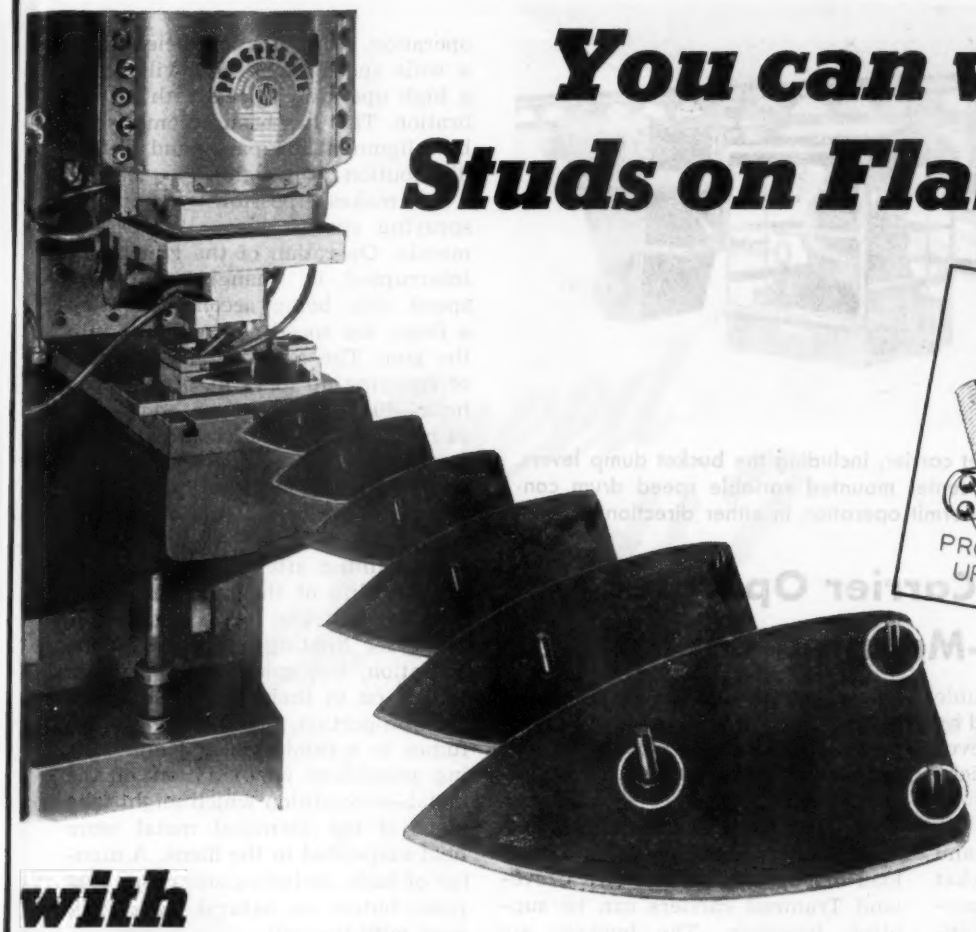
This Phillips plastic dip tank is all-steel, arc-welded, insulated and provided with enclosed controls for constant pre-set temperatures.

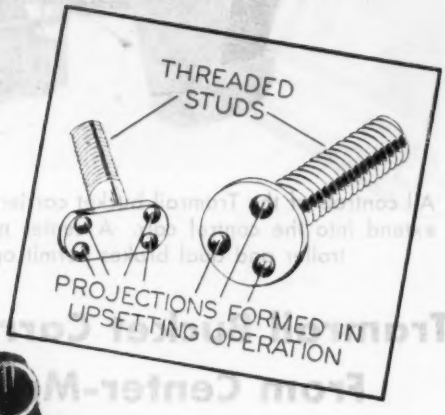
Diamond Impregnated Hones by Oscap Produced in Half-Rounds

The Oscap Manufacturing Co., 207 W. Saratoga St., Baltimore, Md., has announced a half round shape diamond impregnated hone for finishing of carbide, stellite — high speed steel or carbon steel tools.

Synthetic corundum as well as vitrified silicates and glass have also been finished or touched up with the hone. It is stocked in the following sizes: 3/16—¼—5/16—⅜—7/16—½—9/16—⅝—¾—⅞—1 in. radii and in three grit sizes—320, 220 and 100.

You can weld Studs on Flat Plates





with PROGRESSIVE PRESS WELDERS

PROGRESSIVE field engineers, backed by a greatly expanded staff of design and application engineers selected from the resistance welding industry for their breadth of experience and "results", will be glad to help you simplify and speed up your assembly and welding operations.

PROGRESSIVE projection-welding is one of the simplest methods there is to attach one part to another—brackets to larger pieces, forgings to stampings, etc., etc.

Welding dies are simple, hold studs to close tolerances for position. Just drop the parts in place, press a button, and the parts are attached FOR LIFE.

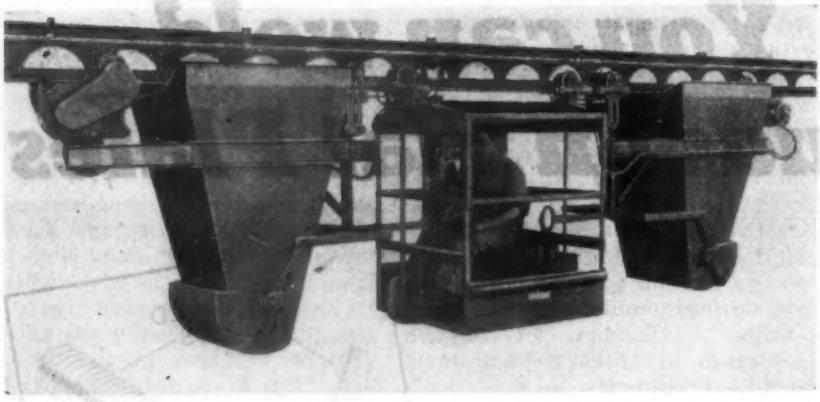
In the example illustrated above, use of standard PROGRESSIVE Press Welders and PROGRESSIVE-ENGINEERED set-up, a number of customary operations are eliminated and yet a BETTER PRODUCT is turned out.

The exact equipment needed for an operation like this depends of course on production quantity. The particular installation shown is being used for high production.

IT PAYS TO WELD

PROGRESSIVE Welder Co. 3050 E. OUTER DRIVE • DETROIT 12

RESISTANCE WELDING EQUIPMENT



All controls of the Tramrail bucket carrier, including the bucket dump levers, extend into the control cab. A center mounted variable speed drum controller and dual brakes permit operation in either direction

Tramrail Bucket Carrier Operated From Center-Mounted Control Cab

A motor-driven cab-operated double bucket carrier has been developed by Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio, for the transportation of dry bulk materials.

The operation of the carrier and the opening and closing of the bucket gates are handled by the cab operator who sits on swivel chair, enabling him to work in the direction of either bucket. A single variable speed drum controller is located on one side of the cab, but two foot brakes are provided, one at either end so that one is always in convenient reach of the operator regardless of which direction he is operating the carrier. Push-pull levers for opening the bucket gates extend into the cab and readily permit the operator to empty the materials in any amounts and at any rate desired.

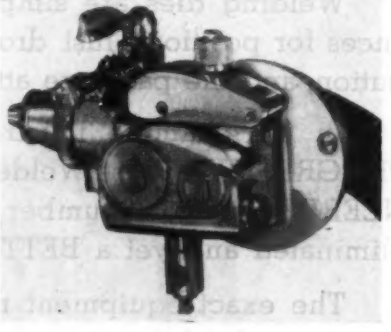
The unit has two 25 cu. ft. buckets and is designed for carrying a total load of two tons. Other size Cleveland Tramrail carriers can be supplied, however. The buckets are designed and located with reference to the tramrail arch beam rail, so that they may be easily filled from overhead bins without interference or spillage.

The carrier is provided with two motorized travel drives, one at each end, and operates at speeds up to 600 feet per minute.

Metallizing Gun by Mogul Improved to Increase Utility

Metallizing Company of America, 1330 West Congress St., Chicago, Ill., have announced the development of the Mogul model F metallizing gun.

Due to the increased efficiency and higher spraying speeds which have been built into this unit, this gun is lighter in weight, better balanced and smoother in operation than previous models. Provision has been made to protect the working parts of the gun against dirt and foreign matter getting into the turbine housing when the gun is not in operation. This is accomplished by screening the exhaust openings of the gun. Another feature of this model is that there are a minimum number of parts and the gun can be assembled or dis-assembled without the use of special tools.



Any combustible gas, such as acetylene, propane, butane, coal gas or natural gas can be used with the Mogul metallizing gun

Mogul model F is equipped with an improved turbine for increased power and is balanced for stable operation. The gun is efficient, has a wide speed range and will reach a high operating speed with no vibration. This has been accomplished by alignment of parts and better distribution of weights.

It makes possible maximum spraying speeds with all types of metals. Operation of the gun is not interrupted in changing spraying speed, this being accomplished by a finger tip speed control built into the gun. The Mogul gun is capable of spraying up to 14 lb. of steel per hour—40 lb. of zinc per hour—and as much as 120 lb. of lead per hour. In utilizing the higher spraying speeds the design gives finer atomization of the metal and maximum deposit, this being of importance in machining after metallizing and for long life of the metallized surfaces. The taper valve permits ¾ range for lighting the gun. In one operation, air, gas and oxygen are turned on in their proper sequence and proportion, thus reducing gas fumes to a minimum and eliminating possibility of oxidation of the metal—a condition which might take place if the atomized metal were held suspended in the flame. A number of fuels, including acetylene, propane, butane or natural gas can be used with the unit.

Tufanhard Surfacing Electrode Overlaps Without Inclusions

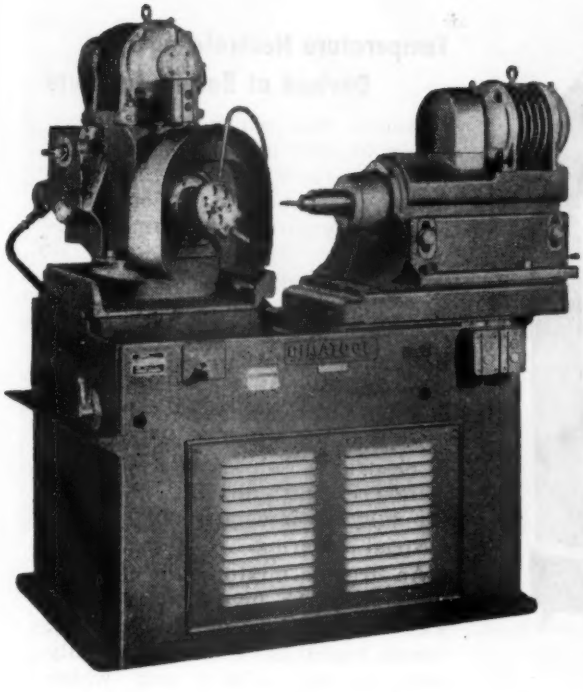
A heavily coated hard surfacing electrode that welds like mild steel has been developed by the Hobart Brothers Co., Troy, Ohio. This electrode, designated as Tufanhard, is made in three grades, 600, 400, and 250, which corresponds with the Brinell hardness of the particular metal to be deposited.

While Tufanhard produces a hard alloy weld, it has the ease and smoothness of operation ordinarily attributed to a heavy coated mild steel rod. It can be used in all positions with no more skill than is required by the so called "cold" rod. The welds can be made continuously with overlapping beads without the necessity of removing the slag, and the low spatter loss and smoothness of bead requires only a small amount of grinding in finishing. The deposit can be heated and drawn to any temper within the range of the type rod used.

Tufanhard will operate on either alternating or direct current, straight polarity being recommended when using d.c. machines. Electrodes are made in 14 in. lengths, in ⅛, 5/32, 3/16 and ¼ in. sizes and packed in 5 lb. and 25 lb. cartons.

High Speed Shock loads?

CONE-DRIVES TAKE THEM EASILY



The ability to maintain smoothness while taking the shock of rapid reciprocations is a direct contribution of CONE-DRIVE gearing to this "postwar" CIMATOOL gear chamfering machine by The SHEFFIELD CORPORATION.

CONE-DRIVE gearing proved its ability to do a better job in such applications as training and elevating drives for all kinds of guns even up to the 16 inchers. Yet, CONE-DRIVE by virtue of its higher load carrying capacity enables a more compact space and weight saving design wherever right angle reductions are required.

If you don't know the story of CONE-DRIVE already and what it can do for your POSTWAR products and equipment, ask for

CW-41B (for Executives)
CW-41A (for Design Engineers)
745 (Post-Graduate Course for Gears)
632 (CONE-DRIVE in Machine Tools)

CONE-DRIVE DIVISION **MICHIGAN TOOL COMPANY**
7171 E. McNichols Road, Detroit 12, U.S.A.

Stonoleum Repairs Breaks In Flooring and Concrete Bases

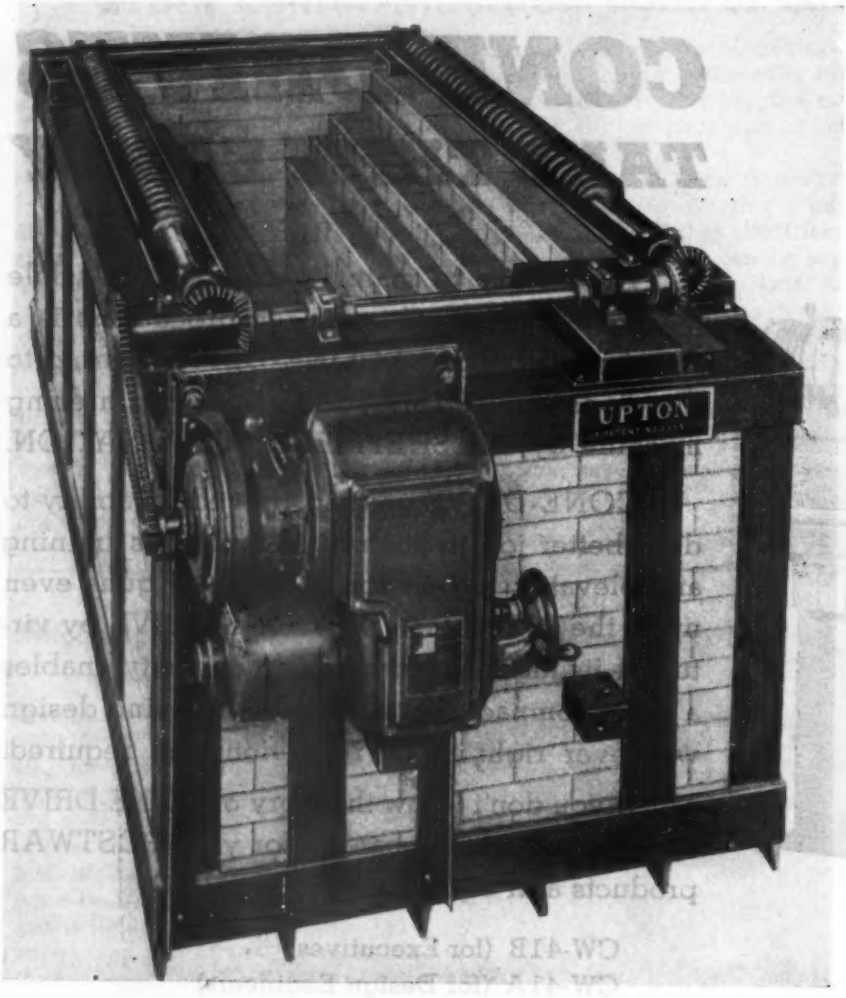
Flooring that can be applied directly over old concrete or any other sub floor is manufactured by the Continental Asbestos & Refining Corp., 1 Madison Ave., New York City. Pitted and cracked cement floors do not have to be chipped away nor does any adhesive or bonding agent have to be used in laying this floor material as it bonds directly.

Known as Stonoleum, this flooring has many of the favorable characteristics of concrete, but it does not dust, crack, pit or crumble. Because of a special colloidal composition it is resilient and hence highly resistant to vibration as well as direct impact and the wear and tear of traffic.

It is also self healing. If a nail is driven into it and then withdrawn, a few days will cause the material to coalesce and the hole will disappear.

Holes left after removal of machinery can be patched with a minimum of effort.

Upton Salt Bath Furnace Provides Even Temperatures for Quenching



Worm propelling drive of Upton salt bath furnace can be adjusted to maintain specific time intervals for production quenching operations

A production salt bath furnace designed for quenching and especially suited for austempering high carbon and other steels is announced by Upton Electric Furnace Div., 7450 Melville, Detroit, Mich.

The quench furnace is designed for a capacity of 1,000 lb. of work per hour at 700 F. The rapidity of quenching which permits this high-speed operation is due to two factors: the step-back design and the method of adding balancing heat. The step-back construction gives sufficient surface area to dissipate heat at a rate in excess of that brought into the furnace by heated work that is to be quenched. Electrodes at the bottom of the furnace supply exactly the right amount of heat to balance and thereby keep the temperature of the salt in the furnace uniform throughout. Since the electrodes are at the bottom of the furnace, circulation of heated salt is normal and insures uniformity of temperature.

With this design and its accompanying temperature control, temperatures are held to ± 5 F.

A variation in the speed with which work progresses through the furnace is available by adjustment of the variable speed transmission which drives the two worms that carry the work through the bath.

In addition to full automatic operation, including temperature control and timing, the scale that coats the work provides protection against oxidation during the interval when the work is being transferred from high heat to quench.

Temperature Neutralizing Flux Devised at Battele Institute

A solder flux which can be used safely in such applications as electrical equipment and can manufacturing has been developed by Battelle Memorial Institute, Columbus, Ohio.

The flux makes possible the easy soldering of many difficult-to-solder combinations of metals. Although the raw flux has an acid reaction, complete neutralization takes place at soldering temperatures. Its residue is noncorrosive, nonconductive to electricity, soluble in water, and nonhygroscopic, making the flux adaptable to a wide variety of industrial soldering.

An organic mixture, the flux resulted from an investigation which was initiated to develop a flux which could be used successfully with low-tin solders and which could be used in the electrical and can-making industries, where zinc chloride or acid fluxes are not recommended.

The flux may be used in soldering copper, steel, silver, brass, various alloys and various electroplated parts, such as nickel-plate, silver-plate, and cadmium-plate. It leaves very little residue on the work and any residue may be washed off readily with water.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

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Climax Molybdenum Company

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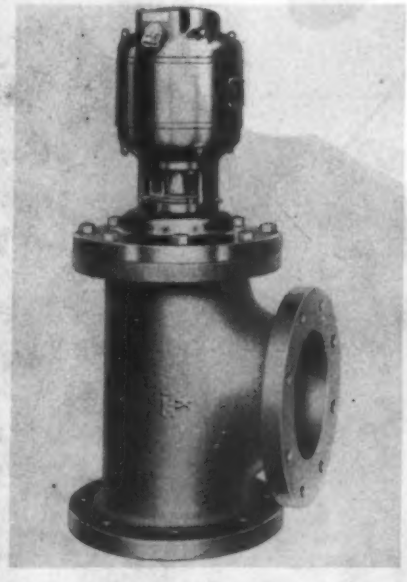
MOLY

Parts and Materials



Axiaflo circulators are designed for installation in restricted spaces

Axiaflo Low-Head Circulators Pump High Liquid Volumes

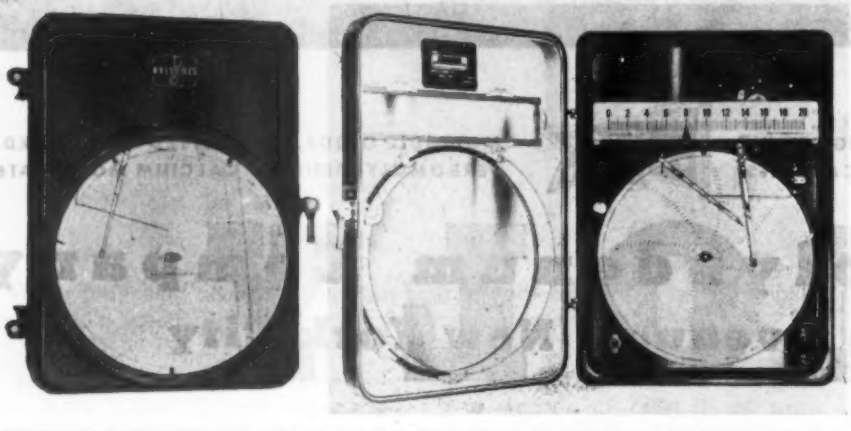
A line of Axiaflo circulators, designed for handling a very large volume of liquid at low heads with minimum power requirements, have been developed by the Ruthman Machinery Co., 1810 Reading Rd., Cincinnati, Ohio. The units are equipped with full ball bearing, totally enclosed, dynamically balanced motors. The balance is achieved by a dynetric process.

The sizes available are 4 in. equipped with ¼ hp. motor; 6 in. with ½ hp. motor. The discharge capacities are 280, 700, 950 and 1200 gallons per minute respectively. Other sizes, including 10 and 12 in. with capacities up to 2500 gallons per minute also are available.

Bristol Operation Recorder Writes Record of Machine Time

An instrument for recording machine running-time has been developed by The Bristol Company, Waterbury 91, Conn., for checking machine performance. The instrument records the operating or "on" time of production machinery and other similar equipment. The chart record gives the total "on" time in hours, minutes, and seconds for a given period. Off" periods are also shown on the chart as well as the time at which they occurred.

The running-time readings are magnified in such a way that the total operating time of a machine can be accurately determined to within a few seconds.



A dial type record of running and idle time (left) is recorded by the Bristol recorder for machine tools. Bristol potentiometer controllers (right) are convertible from Microact to proportional input types by slight changes in accessible wiring.

Bristol Potentiometer Control Used For Furnace Applications

The Bristol Company, Waterbury 91, Connecticut announces a series of electric-type potentiometer controllers. Five basic control unit types are available. Three are electric contact types to be known as the Microact controllers and the other two are electric proportioning and current input types. The control units are mounted on the internal panel of the Bristol Pyromaster potentiometer recorder and any type may be readily converted to any other type by following wiring and mounting instructions.

The three Microact units are provided with one, two, and three precision-type toggle switches, respectively and six different terminal board connection arrangements to meet an assortment of control circuit requirements.

Proportioning controllers may be used with any type of electric proportioning valve and may be had with resetting contacts if required. The proportional current input controller is primarily designed to provide close temperature control of electric furnaces and ovens.

Taperlock V-Belt Sheaves Mount and Demount Quickly

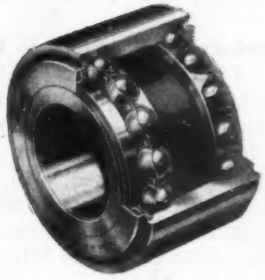
The Taperlock V-belt sheave manufactured by the Dodge Manufacturing Corp., Mishawaka, Ind., presents a means of quickly mounting and demounting V-belt sheaves. A variety of bores and stock sheaves can be handled due to the design.

To install the Taperlock sheave, it is necessary to slip the sheave and bushing assembly onto the shaft and tighten two or three locking screws depending upon the size of the sheave. The screws are in threaded engagement with the sheave hub and free in the bushing groove. As the screws are tightened, they push against the tapered bushing, forcing it into the tapered bored hub. This causes the bushing to contract and wedge between the hub and shaft on

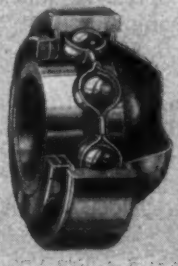
FAMOUS "FIRSTS" by NEW DEPARTURE

First Bicycle Coaster Brake

First Yellow Taxicab



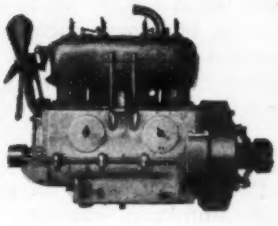
First Self-Sealed Lubricated-for-Life Mine Car Bearing



First Conveyor Roll Bearing

First Dual-Purpose Ball Bearing

First Self-Sealed Bearing Lubricated-for-Life

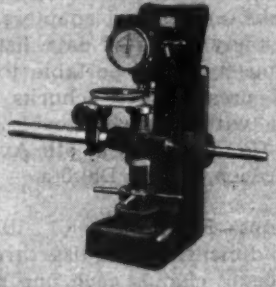


First Engine with Cylinders Cast en Bloc

First Successful Treadle Roll Bearing for Textile Looms

First Fan and Pump Shaft Bearing Self-Sealed and Lubricated-for-Life

3295



Rockwell Hardness Tester

The name New Departure aptly describes an organization whose thought and action has ever been in advance of its time.

A partial record of the "new departures by New Departure" is reported on this page.

Well over 300 million New Departure ball bearings are in this war, and we will stay with this task until the job is done.

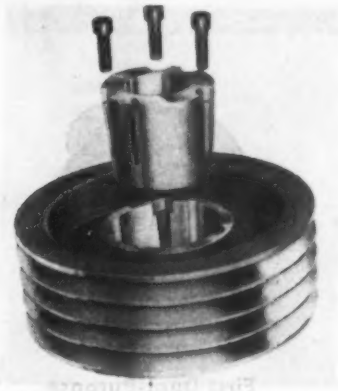
Your future use of ball bearings might well take advantage of New Departure's creative engineering.

Nothing Rolls Like a Ball

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT • DETROIT • CHICAGO • LOS ANGELES

which it has been installed.

To remove the sheave from the shaft, the locking screws are removed and one or two of them are inserted in jack screw holes, which are partially in the bushing and partially in the hub. The portion of the jack screw hole in the bushing is threaded and that in the hub portion is unthreaded. As the screws are tightened, the bushing is dewedged and the sheave is free for removal from the shaft.



Construction of the Taperlock sheave makes possible the provision of a wider range of bores and permits application to all stock sheaves

This construction provides a mounting of minimum dimensions for accommodation of the screws and their connection with hub and bushing. It permits the use of a flangeless bushing and eliminates any extension of either hub or bushing or any collars or protruding parts.

The wedging action provided gives the equivalent of a shrunk-on fit on the shaft whether it is standard or normally undersize. The bushing extends the entire length of the hub providing a full bearing surface. Close mountings are made possible because of elimination of flanges and collars.

Flo-Well Flux for Gas Welds Wets with Little Preheating

Flo-Well No. 1, a free-flowing flux for gas welding of wrought, cast or high tensile aluminum and aluminum alloys, is announced by A. K. Mauk, 7506 Hamilton Ave., Pittsburgh 8, Pa.

Flo-Well will not solidify or deteriorate and can be applied by inexperienced welders.

It is packaged in ¼ to 25 lb. glass containers to protect the flux from moisture.

TRADE PUBLICATIONS

Annealing—8 page technical article "Salt-Baths for Process Annealing, Cyclic Annealing and Descaling." Describes the principle of immersed-electrode type salt-bath furnaces. There are illustrations and graphs. Ajax Electric Co., Inc., Frankford Ave. at Delaware Ave., Philadelphia 23, Pa.

Arbor—Folder describes a spline arbor used in hobbing, shaving and grinding precision gears having splined bores. A. Mackmen Tool & Engineering Co., 1431 W. Lake St., Chicago 7, Ill.

Balancing—Bulletin No. 103 of 8 pages illustrates and describes several types of dynamic balancing machines. Globe Tool & Engineering Co., 200 Davis Ave., Dayton, Ohio.

Bronze—Bulletin 71 illustrates facilities for casting, working, fabricating and testing copper-base alloy parts. Ampco Metal, Inc., 1745 S. 38th St., Milwaukee 4, Wis.

Bushings—Folder No. 8 gives data about the A.S.A. standard stock size drill jig bushings; each type is illustrated by line drawings. Products Engineering Co., 9045 Wilshire Blvd., Beverly Hills, Calif.

Castings—Reference Data Bulletin 45 PMC of 20 pages on permanent mold aluminum castings: provides reliable information on permanent-mold castings. Tables of nominal composition and physical properties are also given. The Permold Co., Medina, Ohio.

Chucks—8 page folder DC45 describes and gives dimensions of chucks, arbors and adapters. There are many pages of data listing the various types of portable tools and drill presses these chucks can be used with interchangeably. K. O. Lee Co., Congress at 5th Ave., S.E., Aberdeen, South Dakota.

Clamps—Folder No. 7 illustrates with dimensions and lists three types of toggle clamps each one made in three different sizes: prices are also given for each size. Products Engineering Co., 9045 Wilshire Blvd., Beverly Hills, Calif.

Conveyors—Form 245-OP describes a light weight portable conveyor of many uses: it is made in straight and curved sections with standard connectors and removable rolls. Lamson Corp., 303 Lamson St., Syracuse 1, N. Y.

Corrosion—64-page book is a digest listing Army-Navy Specifications for corrosion prevention. E. F. Houghton & Co., 301 W. Lehigh Ave., Philadelphia, Pa.

Corrosion—Leaflet gives the properties of materials for corrosion resistant coatings, fluxing, and finishing. Special Chemicals Co., 30 Irving Place, New York 13, N. Y.

Directory of Products & Engineering Literature—Lists information about lines of equipment furnished to nearly every industry. Engineering literature is arranged according to subject discussed. All bulletins are written by outstanding authorities in their respective engineering fields. Allis-Chalmers Mfg. Co., 1941 Ristow St., Milwaukee 1, Wis.

Drills — Manual S-4 about "shankless" drills describes the roll-forged method for forming the bar with the margin, land and strong web, then twisting the bar while it was still hot: this system produces a tougher and stronger steel because the grain lines are not cut, as in milled drills, but follow the helix like the twisted fibers of a rope. This drill has continuous flutes, can be used to the ends, and is driven by removable taper-shank drill-drivers. Republic Drill & Tool Co., 322 S. Green St., Chicago 7, Ill.

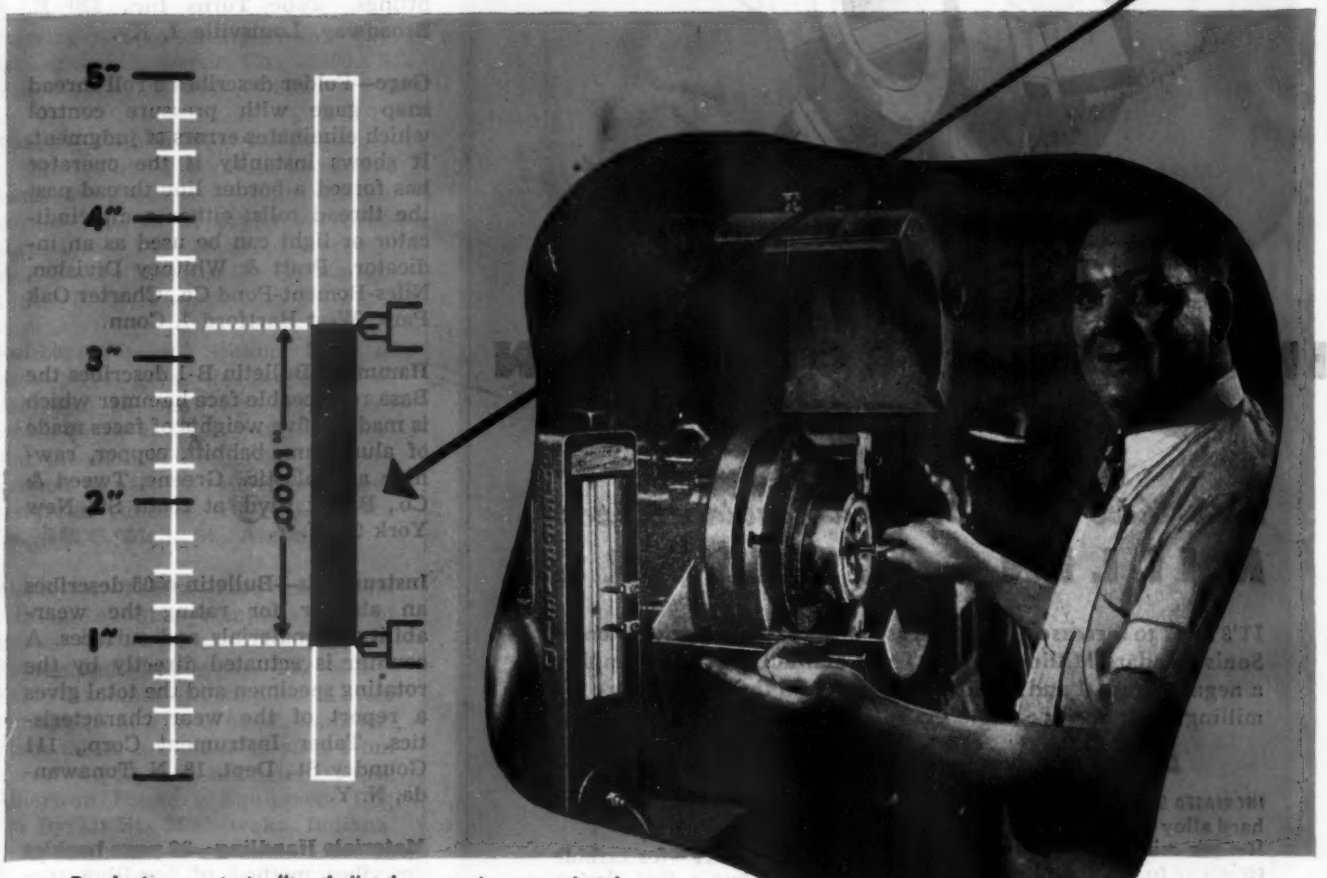
Drilling—Circular No. 145 describes Holeway machines for numerous kinds of multiple drilling, boring and tapping which are arranged for many types of production in large quantities. National Automatic Tool Co., Inc., Richmond, Ind.

Electric Products—Form GU-86 is a 16 page folder which describes and illustrates briefly the entire line of electrical and automotive products such as motors, transformers, industrial brakes and controls, hydraulic brakes, air brakes, tachographs (speed recording speedometers), brake lining and brake service tools. Wagner Electric Corp., 6444 Plymouth Ave., St. Louis 14, Mo.

Electrical Equipment — Underwriters' Laboratories list of inspected equipment, May 1945, 424 pages list all inspected equipment manufactured by many companies. Un-

Checking to "TENTHS"

can be like reading inches on a yardstick



Producing parts to "tenths" tolerance is a tough job on most any machine and to most any operator—that is if no indicating gage is available to tell the operator "where he is", and which way "the machine is going."

With a Precisionaire to use right at the machine on which the operator can read "tenths" as he would read inches on a yardstick, he can see "where he is". Working to "tenths" becomes as easy as working to "thousandths". And most important of all, he knows that every piece accepted on the Precisionaire is "right".

Scrap is reduced to a few incorrect pieces possibly made during the machine setup—no additional scrap need result as the Precisionaire tells the operator to adjust his tooling and machine before parts "go out of tolerance".

The Precisionaire checks internal or external dimensions with equal accuracy. It is available in four models of different amplifications for tolerances ranging downward from .005" to fractions of a "tenth". Hundreds of Model No. 600-0 are being used in various plants right at the machine to check to plus or minus five millionths of an inch. Thousands of lower amplification models are used daily in receiving, process and final inspection in the nation's production plants.

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SHEFFIELD MASTER CRAFTSMEN

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MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES

Half-Side Straddle Milling Cutter for hard alloy steel, illustrated.

INCREASE PRODUCTION

as many as

10 TIMES

with these new standard carbide tipped

MILLING CUTTERS

IT'S EASY to increase production as many as 10 times with Wendt-Sonis Standard Milling Cutters. These new milling cutters employ a negative radial and helix angle feature on the cutting edge for milling steel; positive angle for milling non-ferrous materials.

Distinctive Advantages of W-S Milling Cutters

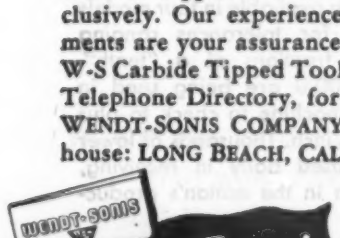
INCREASED SURFACE FEED—Machines hard alloy steel up to 750 surface feet per minute; non-ferrous materials up to 3400 surface feet per minute.

PREVENTS VIBRATION—The built-in heavy lug fly-wheel prevents vibration, adds strength to cutters; lengthens life of tool between sharpenings.

ESPECIALLY DESIGNED—for carbide cutting—not just a HSS design with carbide tips. Recommended for milling all types of material.

EASILY RESHARPENED—on any universal tool and cutter grinder.

Carbide Tipped Tools are a specialty with us. We make them exclusively. Our experience, research, development and improvements are your assurance of complete satisfaction when you use W-S Carbide Tipped Tools. Refer to "TOOLS" in your Classified Telephone Directory, for your local W-S Distributor, or write WENDT-SONIS COMPANY, HANNIBAL, MISSOURI. Branch Warehouse: LONG BEACH, CALIFORNIA.



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BORING TOOLS • CENTERS • COUNTERBORES • SPOTFACERS • CUT-OFF TOOLS • DRILLS • END MILLS • FLY CUTTERS • TOOL BITS • MILLING CUTTERS • REAMERS • ROLLER TURNING TOOLS • ROUTER BITS • SPECIAL TOOLS

Fittings—Booklet TT46 gives the formulas for calculating the volumetric capacities in cubic inches of many types of welding fittings; three double pages of tabulated data apply to various sizes and kinds of fittings. Tube Turns Inc., 220 E. Broadway, Louisville 1, Ky.

Gage—Folder describes a roll thread snap gage with pressure control which eliminates errors of judgment. It shows instantly if the operator has forced a border line thread past the thread rolls: either a dial indicator or light can be used as an indicator. Pratt & Whitney Division, Niles-Bement-Pond Co., Charter Oak Park, West Hartford 1, Conn.

Hammer—Bulletin B-1 describes the Basa replaceable face hammer which is made in five weights of faces made of aluminum, babbitt, copper, rawhide and plastic. Greene, Tweed & Co., Bronx Blvd. at 238th St., New York 66, N. Y.

Instruments—Bulletin 4505 describes an abraser for rating the wearability of materials and surfaces. A counter is actuated directly by the rotating specimen and the total gives a report of the wear characteristics. Taber Instrument Corp., 111 Goundry St., Dept. 18, N. Tonawanda, N. Y.

Materials Handling—36 page booklet describes method of handling material from the time it enters the factory until it is delivered. Towmotor Corporation, 1237 E. 152nd St., Cleveland 10, Ohio.

Ovens—Catalogs 115 and 116 illustrate and describe many types of gas fired and electric heating ovens for temperatures up to 1250 F. used in many manufacturing processes. Gehnrich Oven Division, W. S. Rockwell Co., 108 Jewel St., Brooklyn 22, N. Y.

Pins—Specifications for precision ground taper pins; this book gives a set of standards with tolerances on the degree of taper, roundness, overall length and size. Centerless Grinding Co., 19 Staples St., Bridgeport 1, Conn.

Printing—Folder 1018 describes and illustrates the methods and variety machines for producing black line prints on a white background.

Charles Bruning Co., Inc., 4700 Montrose Ave., Chicago 41, Ill.

Production Control—Folder A-694 entitled "ABC's of Production Control" displays a series of charts to illustrate various elements of control. The use of carbon-backed and other types of multi-copy production forms makes accurate information available in several departments at the same time without rewriting, copying or duplicating in any way. McCaskey Register Co., 2500 S. Union Ave., Alliance, Ohio.

Pumps—Bulletin No. 463 describes, illustrates and gives data about five sizes of motor-driven high vacuum pumps capable of producing pressures lower than 28 in. of mercury. F. J. Stokes Machine Co., Tabor Rd., Olney P. O., Philadelphia 20, Pa.

Rubber—Catalog Section 8000 of eight pages gives the properties of Ameripol D, there are four tables which show the physical, chemical and mechanical properties in comparison to natural rubber and other synthetic rubbers. B. F. Goodrich Co., 448 S. Main St., Akron, O.

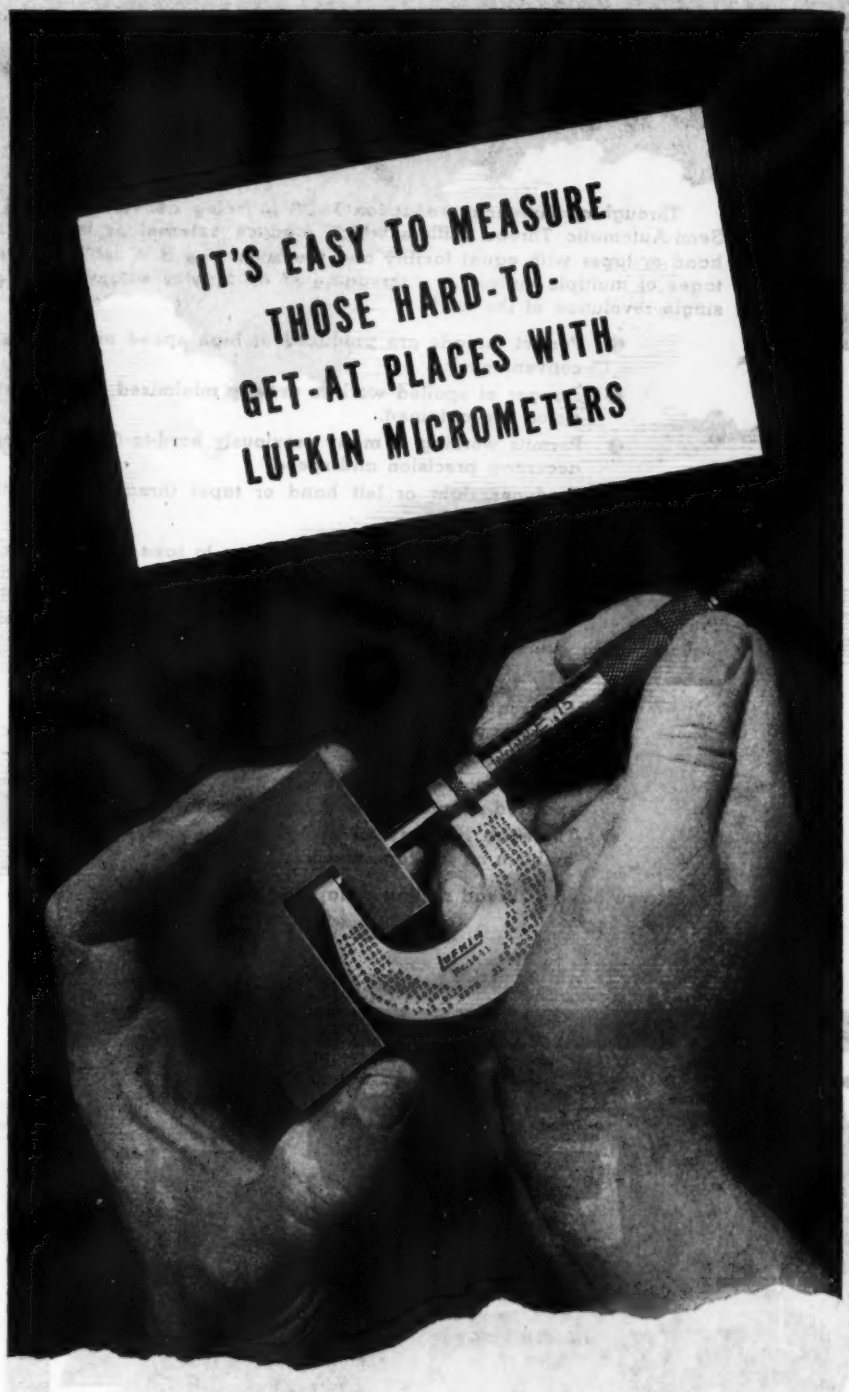
Sandblast Tables—Five individual catalogs about a complete line of airless Wheelabrator Tables, Multi-Rotary and plain types. The Multi-Table machines are supplied in sizes ranging from 8 in. to 66 in. diameter. Plain tables are made in sizes from 6 feet to 12 feet diameter tables. American Foundry Equipment Co., 555 Byrkit St., Mishawaka, Indiana.

Slings—Folder of four pages describes an automatic equalizing chain sling. There is an equalizing sheave which is spring mounted to permit the chain to shift until the hook is over the center of gravity. Hercules Sling Co., Rockford, Ill.

Steel Treating—18 page book in color illustrates facilities for heat treating steel in many sizes and forms. Wesley Steel Treating Co., 1333 W. Pierce St., Milwaukee, Wis.

Steel—Catalog of 128 pages about tool steel lists the chemical composition, application, forging and annealing temperatures, hardening and drawing practice and bar stock sizes. Columbia Tool Steel Co., Chicago Heights, Ill.

Stoneware—Bulletin H about corrosion resistant materials and equipment describes and illustrates Tygon plastic compounds of seven different types, chemical stoneware of



The frame of the Lufkin Micrometer has been re-designed so that the end nearest the anvil tapers gracefully to a narrower width. Now with a Lufkin mike you can measure those hard-to-get-at surfaces where clearance is small. Note, however, that only the design has been changed. The quality and superior workmanship which for years have distinguished all Lufkin tools, remain unchanged in Lufkin mikes. Today, tomorrow, always—Lufkin micrometers will give you positive accuracy with dependable durability. See the new Lufkin micrometers at your dealer's. For free catalog write THE LUFKIN RULE CO., SAGINAW, MICHIGAN, New York City.

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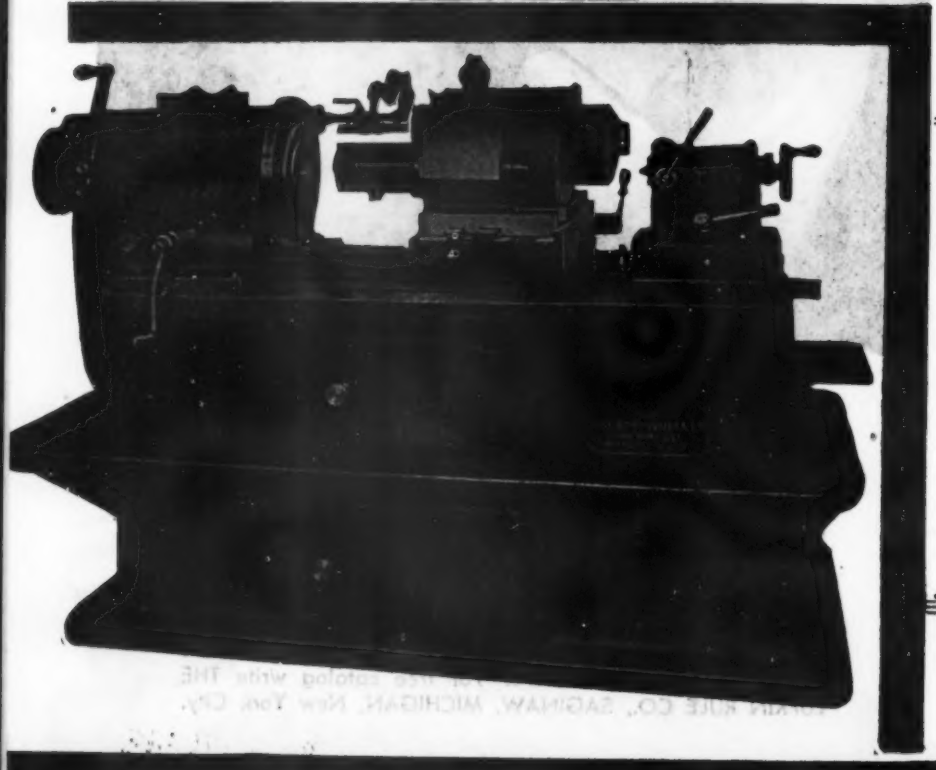

(Left) 8 x 16 inch Hanson-Whitney Semi-Automatic Thread Miller. Capacity: 8" diameter external with 2½" cutter; 8" diameter (max.) internal with 2½" cutter and 1" diameter (minimum) with 7/16" cutter.

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many shapes. U. S. Stoneware Co., 5300 E. Tallmadge Ave., Akron, Ohio.

Tapping—Booklet describes applications of Rotorex precision tapping attachment for standard drill presses for controlled lead precision tapping. Douglas Machinery Co., Inc., 150 Broadway, New York, N. Y.

Threads—Bulletin 242 describes the Aero-Thread system which consists of three parts, a stud or bolt with a semicircular thread section, a helical precision-formed coil of stainless steel or phosphor bronze whose cross-section at the inside of the coil fits the semicircular thread of the stud or screw and the outside of the coil is the modified American National thread, and the non-ferrous metal parts tapped with a truncated V thread to receive the insert. Aircraft Screw Products Co., Inc., 47-23 35th St., Long Island City 1, N. Y.

Threads—Folder No. 1 is about thread rolling in action, it illustrates and gives production rates for several types of threaded products. This is the first of a series which will appear at odd intervals. Rolled Thread Die Co., 40 Dewey St., Worcester 2, Mass.

Tools—Twelve page book "The Tool & Die Industry Unites" describes the aims and activities of the National Tool & Die Manufacturers Assn., Union Commerce Bldg., Ninth St. & Euclid Ave., Cleveland 14, Ohio.

Tools—Catalog illustrates and describes standard toolholders and special tools for a wide range of machine work. Gairing Tool Co., 21221 Hoover Road, Detroit 32, Mich., address mail to P. O. Box 478, Roosevelt Park annex, Detroit, Mich.

Vises—Folder 348 describes, illustrates and gives dimensions about drillpress vises which can be adapted to numerous machining operations. Chicago Tool & Engineering Co., 8383 S. Chicago Ave., Chicago 17, Ill.

Welding — A simplified reference chart for high and low alloy welding electrodes. The data is grouped for quick reference and includes weld metal chemical analyses, information about corrosion and heat resistance and weld metal surfacing, welding currents and voltages and stub end color identification. Arcos Corp., 311 Gulf Bldg., Philadelphia 2, Pa.

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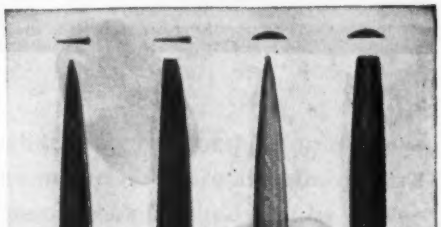

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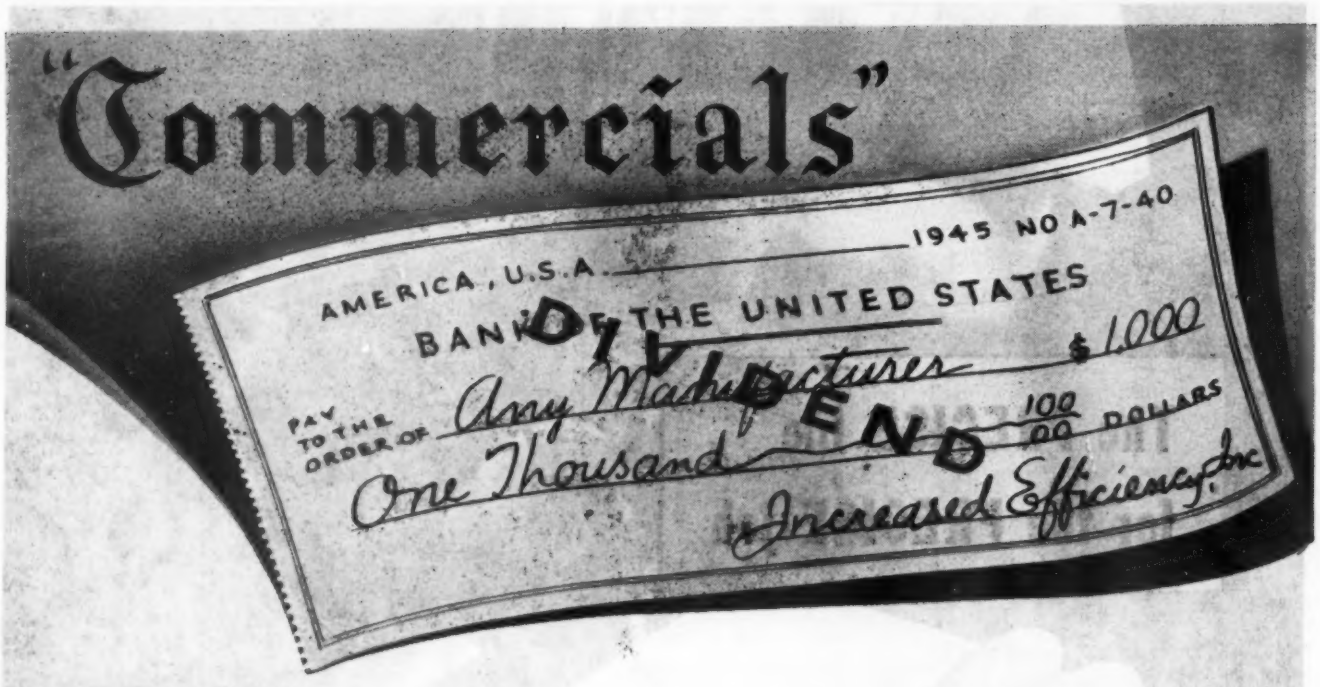
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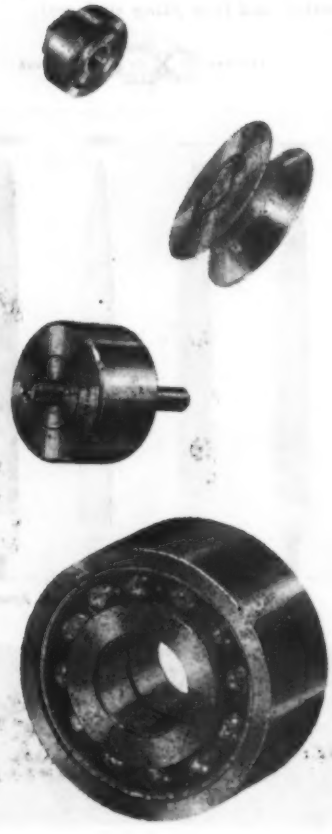

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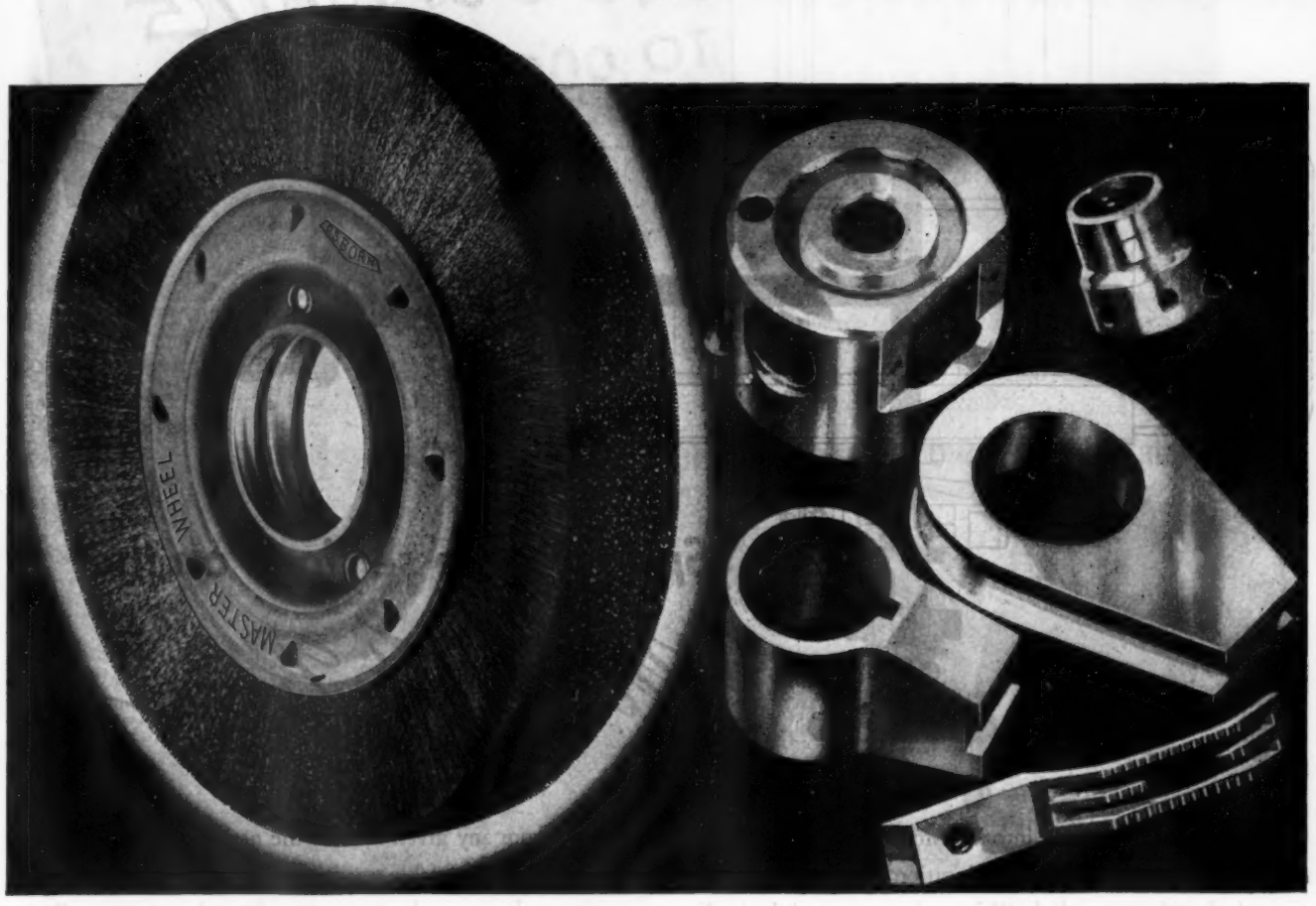

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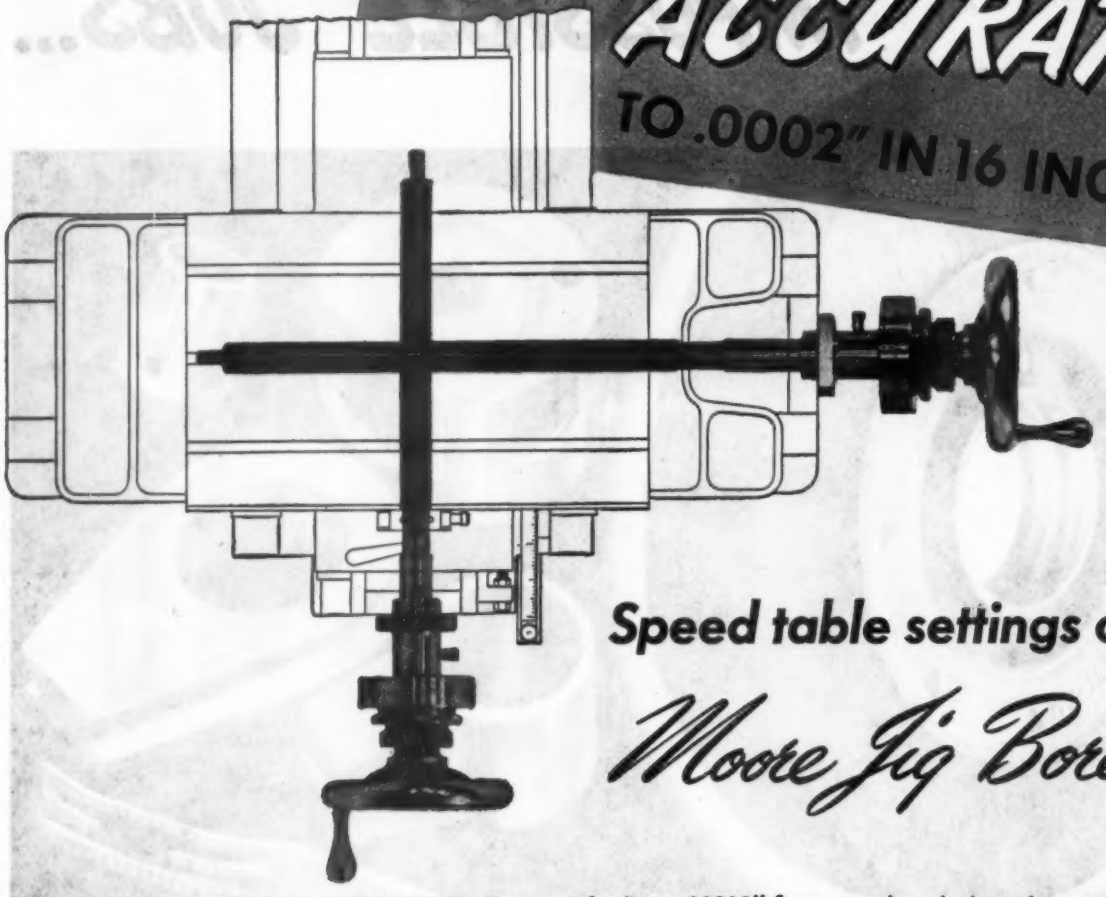
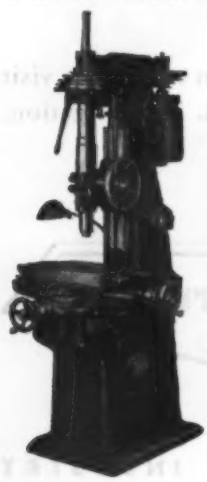
LEAD SCREWS ACCURATE TO .0002" IN 16 INCHES



Speed table settings on the *Moore Jig Borer*

Accurate lead screws built into the Moore Jig Borer *mechanically* guide the work to precise location within .0001" *at a turn of the micrometer dials.* This exclusive principle in Jig Borer construction reduces the margin of human error on table settings and simplifies operation. The built-in accuracy of the lead screws also assures *constant* precision, unaffected by the temperature fluctuation encountered in the use of exposed size blocks or end measures. And this lead screw accuracy has been maintained even after ten years of constant operation in Moore machines.



Exclusive Moore methods of hardening, seasoning, stabilizing, thread-grinding and lapping enable the cross and longitudinal lead screws to give hole-location accuracy of .0002" over 16 inches of travel and .00005" from any given inch to the next.

With such dependable precision, table settings can be made rapidly and accurately in any position by the coordinate location method. On the Moore Jig Borer, you can spot, drill, bore and ream *all* holes in the work-piece consecutively, with minimum tool changes. In addition, each machine serves as its own "inspector."

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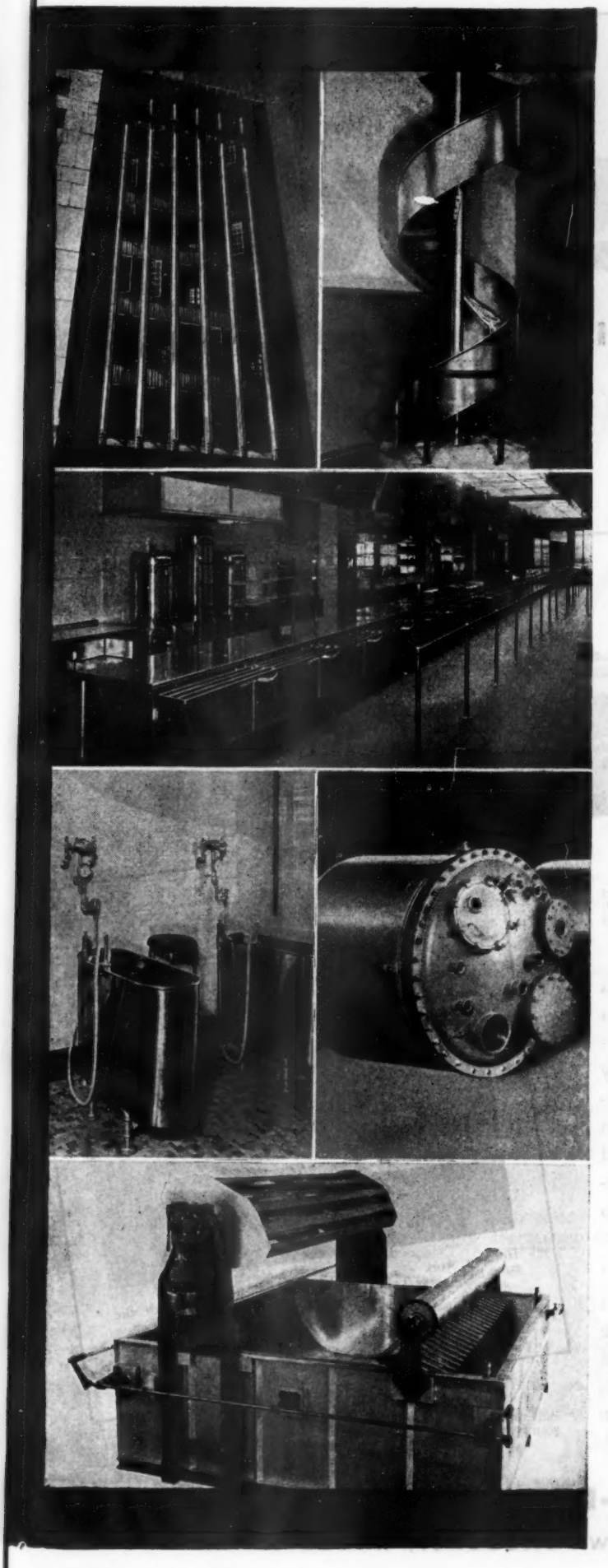

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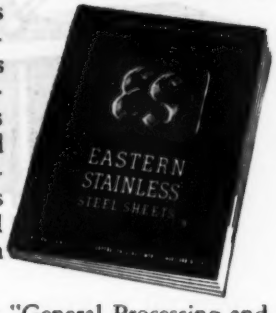

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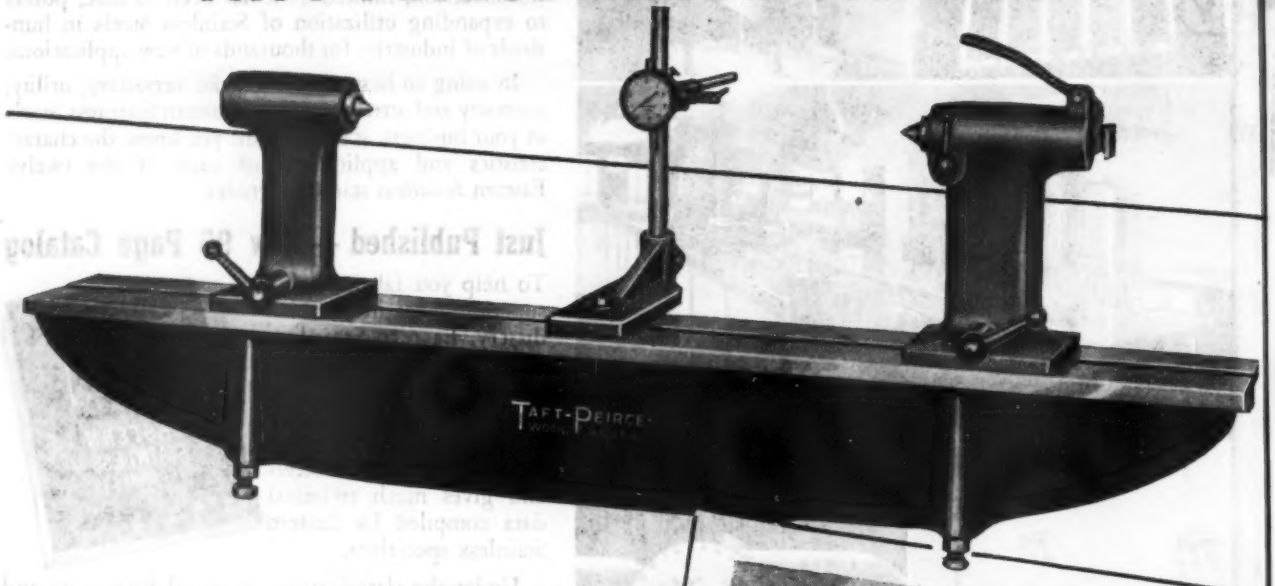

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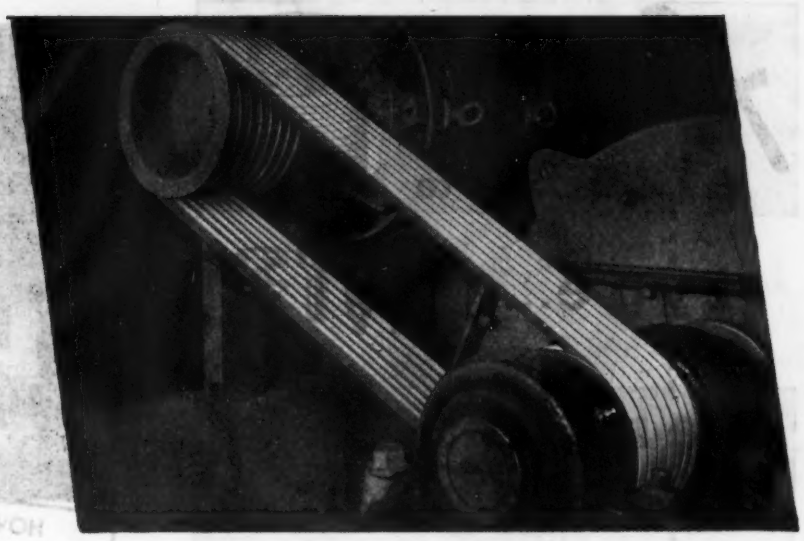

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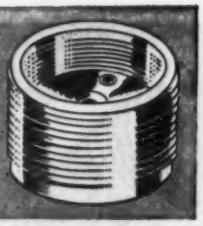

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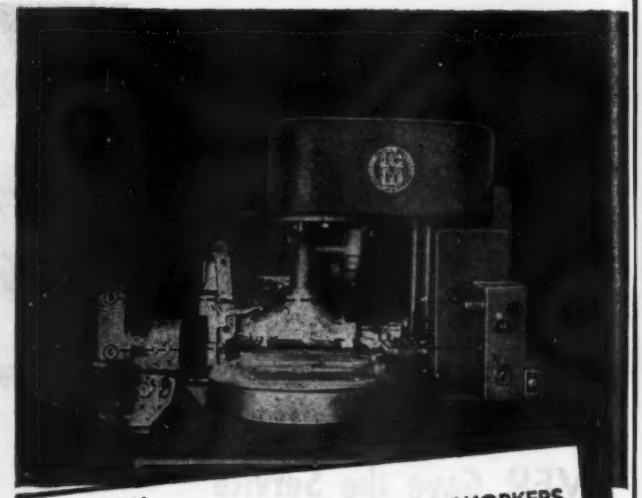

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Its operation (shown diagrammatically) is simple and effective. The area in which hands are in danger is covered by two protective beams of light originating at (A) passing to (B) where it is reflected from an angled mirror to a similar mirror at (C) which in turn reflects it to the photo-electric cell (D). Any interruption of either of these beams automatically stops the machine and protects the hand from the pressure cutter rollers (E) moving across the die and from other moving parts. The interruption of the beam is also indicated by a monitor light at (G). The machine cannot run while the light beams are interrupted and remains at rest even after removal of the obstruction, till the operator presses reset button (F).

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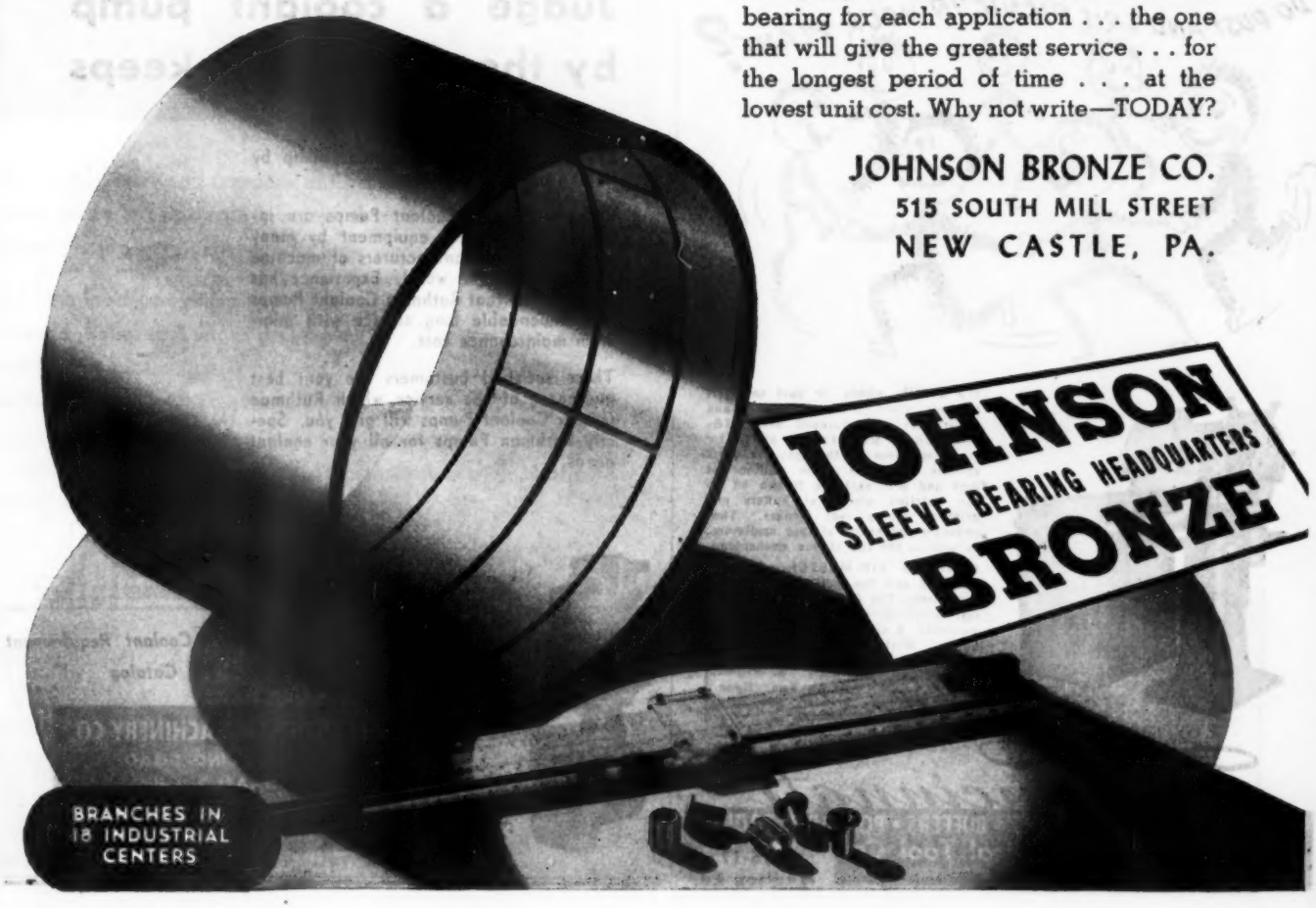

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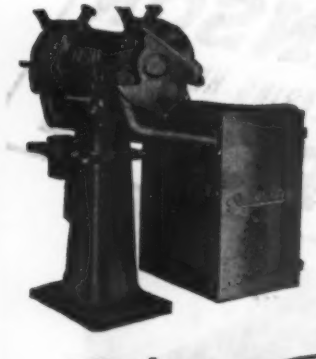
DO DUST AND GRIT PICNIC IN YOUR PLANT?



It's a daily picnic for dust and grit in your plant if your grinders and buffers are not equipped with AIR-MASTERS. But it's no picnic for your employees or the sensitive parts of fine machinery. The millions of dust and grit particles thrown off by the whirling wheels of buffers and grinders are a real menace. They endanger the health of your employees, as well as the life of fine mechanisms.

Install the AIR-MASTER. It traps dust and grit the moment they fly off the wheels. The AIR-MASTER is fully self-contained—efficient, rugged, dependable. A size for every grinder and buffer. Write today for full details.

NOW AVAILABLE: Two, three and five H.P. grinders and buffers. Write for catalog.

The Cincinnati
ELECTRIC DRILLS • GRINDERS • BUFFERS • PORTABLE TOOLS
The Cincinnati Electrical Tool Co.
A DIVISION OF THE R. K. LEBLOND MACHINE TOOL CO. CINCINNATI, OHIO
2615-17 Madison Rd.

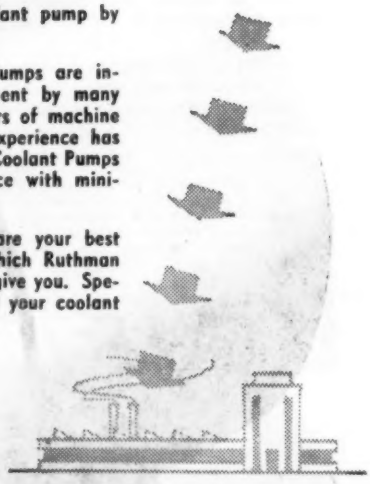
Judge a coolant pump by the company it keeps

You can best judge a coolant pump by finding out who uses it.

Ruthman Gusher Coolant Pumps are installed as standard equipment by many of the leading manufacturers of machine tools all over the world. Experience has taught them that Ruthman Coolant Pumps give dependable long service with minimum maintenance cost.

These satisfied customers are your best guarantee of the service which Ruthman Gusher Coolant Pumps will give you. Specify Ruthman Pumps for all your coolant needs.

Model 11020-A



There's a Gusher for Every Coolant Requirement
Write Us Now For Catalog

THE RUTHMAN MACHINERY CO.
1809 READING ROAD
CINCINNATI 2, OHIO
The "GUSHER"—A Modern Pump For Modern Machine Tools

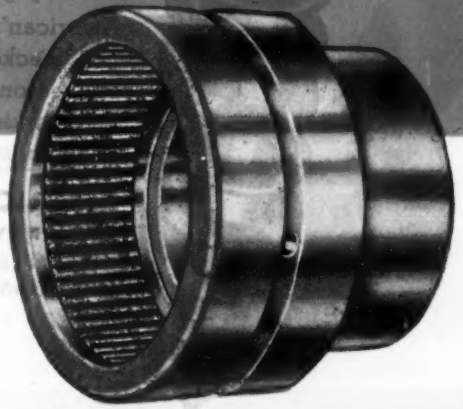
ORANGE
ROLLER BUSHINGS

stand up under severe strain and continual overloading in GAR WOOD CRANES & WINCHES

Gar Wood Wrecking Cranes and Winches are used by the armed forces on every battlefront. Orange Roller Bushings are installed in the majority of this equipment. The Tank Recovery Unit (top) uses Orange Roller Bushings as sheave bearings in the two 60,000 lb. pull winches. Wrecking Cranes (left) use Orange Roller Bushings in boom pivot and topping pivot. Also used in adapter gear of power take-off in front end winches of Army 6x6 trucks.

The rugged overload capacity of Orange Roller Bushings has never been demonstrated better than in war equipment, where "rated" capacity means little under stress of battle.

The high load-carrying capacity in small space provided by Orange Roller Bushings, gives you the answer wherever anti-friction protection is needed on rotating or oscillating parts. And with it—assurance of smooth, quiet, long-life operation because these precision bearings have closer internal running clearances, thus maintain true alignment of rollers with highly finished raceways.



Orange Roller Bushings are made in a full range of sizes and types. Consult our engineers on any bearing application.

Mail Coupon for Engineering Data

Orange Roller Bearing Co., Inc., AM
Orange, N. J.

Please send me your Roller Bushing Data Book

Name..... Title.....

Company.....

Address.....

City..... State.....

ORANGE ROLLER BEARING CO., INC.
554 Main Street, Orange, N. J.

4 INSPECTIONS!

That's why Screw and Bolt Buyers Say:

"AMERICAN brand is 100% OK!"

1. Raw Material Inspection: Every month, American buys hundreds of miles of steel, brass, bronze, and everdur. And every lot is checked for quality before going into production.

2. Process Inspection: Product-samples are checked every few minutes to make sure that machines are maintaining accuracy on every process . . . heading, slotting, shaving, threading.

3. Head, Thread & Point Inspection: Moving along on conveyor belts, screws are individually checked to make sure there are no burred heads, drunken threads, or dull points.

4. Automatic Weigh-Count: Each newly filled box of screws is weighed against a counted gross, to make sure that there are at least 144 perfect American Screws in every gross-box.

American's modern, high-speed manufacturing methods . . . checked by these four inspections . . . are easy-to-see reasons why more and more screw and bolt buyers are marking their orders: "American brand . . . don't substitute."

AMERICAN SCREW COMPANY
PROVIDENCE 1, RHODE ISLAND
Chicago 11: 589 E. Illinois Street
Detroit: 502 Stephenson Building

Put the Screws on the Japs... BUY BONDS

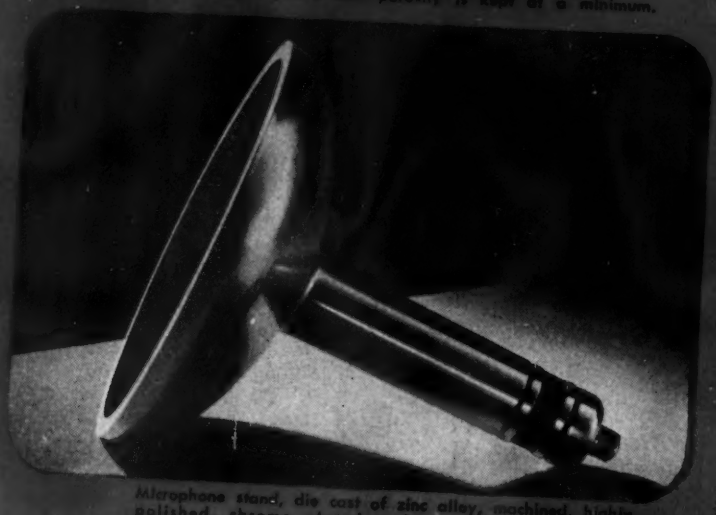
...and here's WHY American Phillips Screws COST LESS on any Screw Driving job

1. Faster Starting—One hand holds driver, other holds work. No wobbling, no dropped screws. Phillips screw and driver remain as one self-aligned unit until screw is driven.

2. Cleaner Fastenings—*every time.* No slanted screws to back out. No gouged work-surfaces, or burred screw-heads. Even unskilled workers get skilled results right from the start.

Quality ...inside and out

Typical X-ray of a microphone stand, taken from a production run, to insure that porosity is kept at a minimum.



Microphone stand, die cast of zinc alloy, machined, highly polished, chrome plated and painted, by Auto-Lite.

Combining the most exacting laboratory inspection with modern equipment and manufacturing know-how accumulated over a period of many years, the Die Casting Division of Auto-Lite continues to maintain its reputation for quality—inside and out.

Auto-Lite inspection includes spectographic analysis, metallographic study, physical testing and X-ray inspection for density of structure. No test is neglected in the constant search for dependable quality. Here, too, at Auto-Lite you will find complete facilities for die casting, precision machining, polishing, plating, painting, cronaking and anodizing — all under one roof. For complete information, write to

THE ELECTRIC AUTO-LITE COMPANY

Die Casting Division

WOODSTOCK, ILLINOIS

600 S. Michigan Ave., CHICAGO 5, ILLINOIS • **723 New Center Bldg., DETROIT 2, MICHIGAN**

BUY WAR BONDS

AUTO-LITE Die Casting

TUNE IN "EVERYTHING FOR THE BOYS" STARRING DICK HAYMES—EVERY TUESDAY NIGHT—NBC NETWORK

it can't happen to any product when ball bearings are Fafnir-sealed

There's no such thing as "just a little oil" when it creeps into and onto such products as paper, textiles, foods or leather goods. Any oil is too much oil.

That's where Fafnir has done some of its greatest pioneering . . . in the development of several types of grease-retaining seals for all types of ball bearings.

For instance, the Fafnir Mechani-Seal, a precision fitted system of interlocking steel plates which actually trap any lubricant that may possibly escape from the bearing.

And the Fafnir Plya-Seal which utilizes the natural flattening out tendency of synthetic rubber to make a self-adjusting washer. It's always grease-tight. It's removable for inspection and servicing. And it's revolutionizing: in many sizes it makes possible a sealed bearing no wider than standard unsealed bearings.

Why pay the high costs of oil spoilage when it costs so little to replace old-fashioned oil-leaking, oil-dripping plain bearings? Let a Fafnir engineer show you how it can be done. The Fafnir Bearing Company, New Britain, Conn.

★ 2210

MOST COMPLETE LINE IN AMERICA

FAFNIR BALL BEARINGS

This little bolt does a job that's

BIG

This little bolt does a big job in the compressor unit of a famous electric refrigerator. Once it was a problem child because it had to be machined individually from bar stock. Now Buffalo Bolt engineers have devised a process of shaping it out of drawn wire and threading it in a single, fast and economical operation. Another example of the versatility of our modern equipment.

BUFFALO BOLT COMPANY

NORTH TONAWANDA, NEW YORK
SALES OFFICES IN PRINCIPAL CITIES

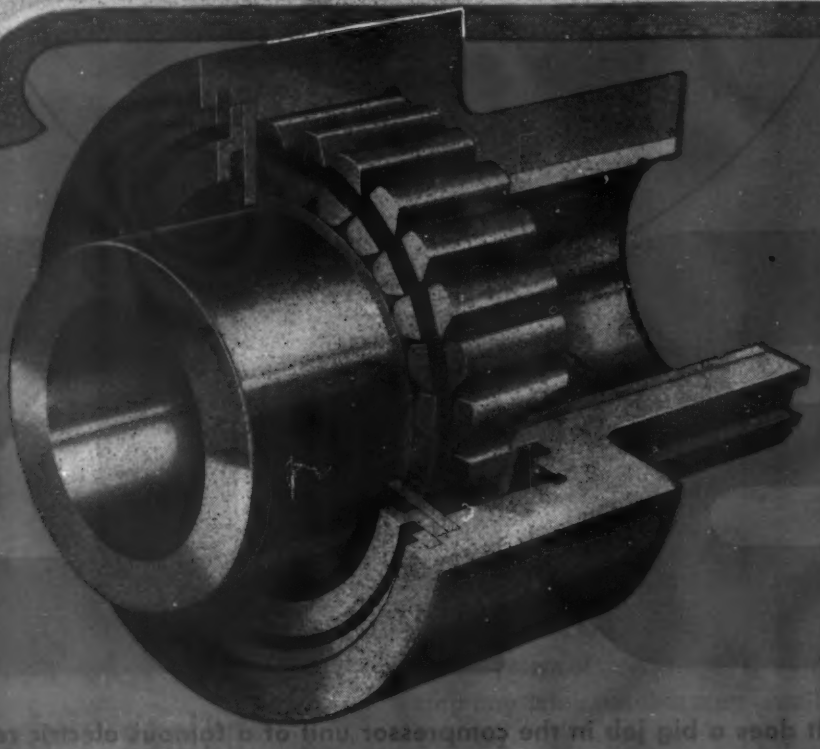
Each of this battery of Buffalo Bolt roll threaders has a capacity of 43,000 bolts per working day.

Geargrind Announces

FORMSPRAG

THE FULL COMPLEMENT

Over-Running Clutch



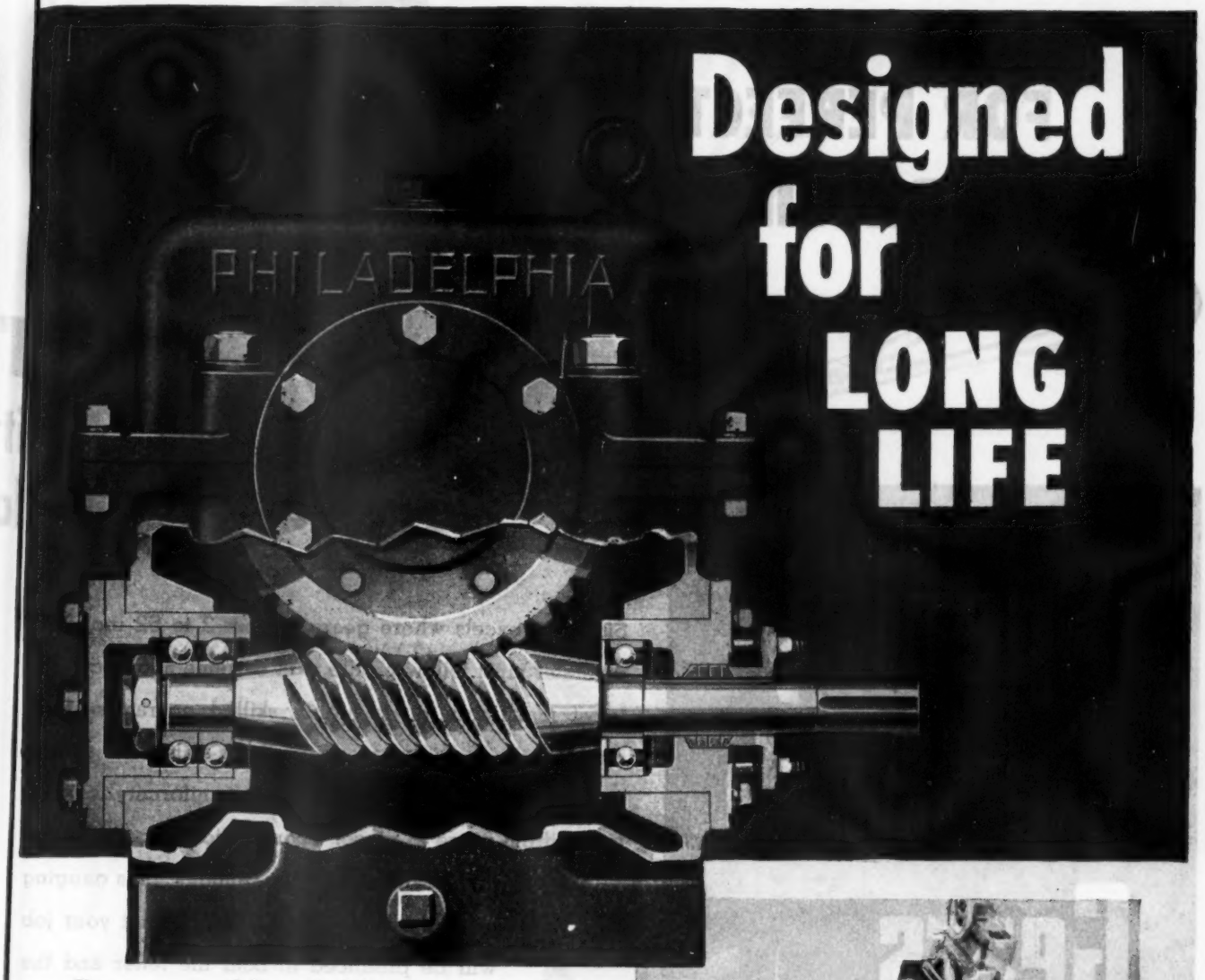
The FORMSPRAG consists of inner and outer members which form a cylindrical, annular space completely filled with spring energized sprags. ¶ Torque is delivered through many points of contact, with an infinite number of "stations". Once torque is removed the sprags release—instantaneously. ¶ This simple design permits the greatest possible torque capacity for size and weight.

For full information, write for folder, and outline your requirements.

The GEAR GRINDING MACHINE COMPANY

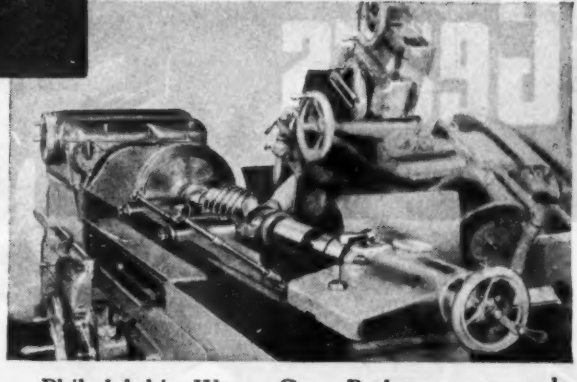
DETROIT 11, MICH. U.S.A.

Designed for LONG LIFE



For a compact right angle drive that combines long life and trouble free operation get a Philadelphia Worm Gear Speed Reducer. In every way it will give service superior to open worm gearing which is exposed to dust and dirt, is poorly lubricated and subject to misalignment because of flimsy bearing supports.

In the design of Philadelphia Worm Gear Units factors causing wear have been eliminated. The tight, sturdy housing keeps out the dirt while providing a rigid support for the ball or roller bearings on which both worm and gear are mounted. The gear is made of special analysis chill cast bronze. The worm is case hardened alloy steel with threads precision ground in thread grinder as shown at right. An oil bath in which the worm revolves also provides lubrication for the gear and bearings.

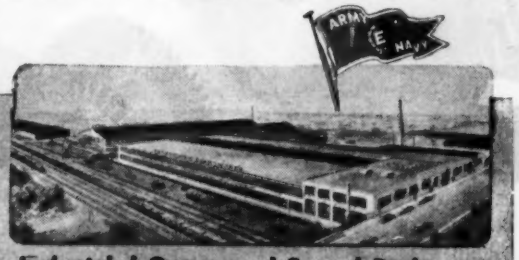


Philadelphia Worm Gear Reducers are made in both horizontal and vertical types. For complete description of sizes, standard ratios and information on selection of the proper worm gear drive for your job, write on your business letterhead for Catalog No. 25.

Philadelphia

GEAR WORKS INCORPORATED

ERIE AVE. AND G ST., PHILADELPHIA 34, PA. NEW YORK • PITTSBURGH • CHICAGO



Industrial Gears and Speed Reducers
LimiTorque Valve Controls

FOR PERFECT PROFILES...

Specify Sier-Bath Gears

Sier-Bath excels where gears of from 2 to 52 inches in diameter must follow profile with extreme accuracy. The latest machinery gives highly skilled operators—thoroughly schooled in our own methods—absolute control over gear cutting. High dimensional uniformity is maintained from piece to piece. Coordination of gear cutting and heat treating departments, plus gauging at every step makes it certain that your job will be produced to both the letter and the spirit of the specifications. Write us today.

☆ *1945 MARKS OUR 40TH YEAR OF SERVICE* ☆

• Sier-Bath Gears are made in all materials, in all sizes from 2" to 52" in diameter.

Sier-Bath Gear Co. Inc.

SIER-BATH GEAR COMPANY, INC. • 9246 HUDSON BLVD., NORTH BERGEN, N. J.

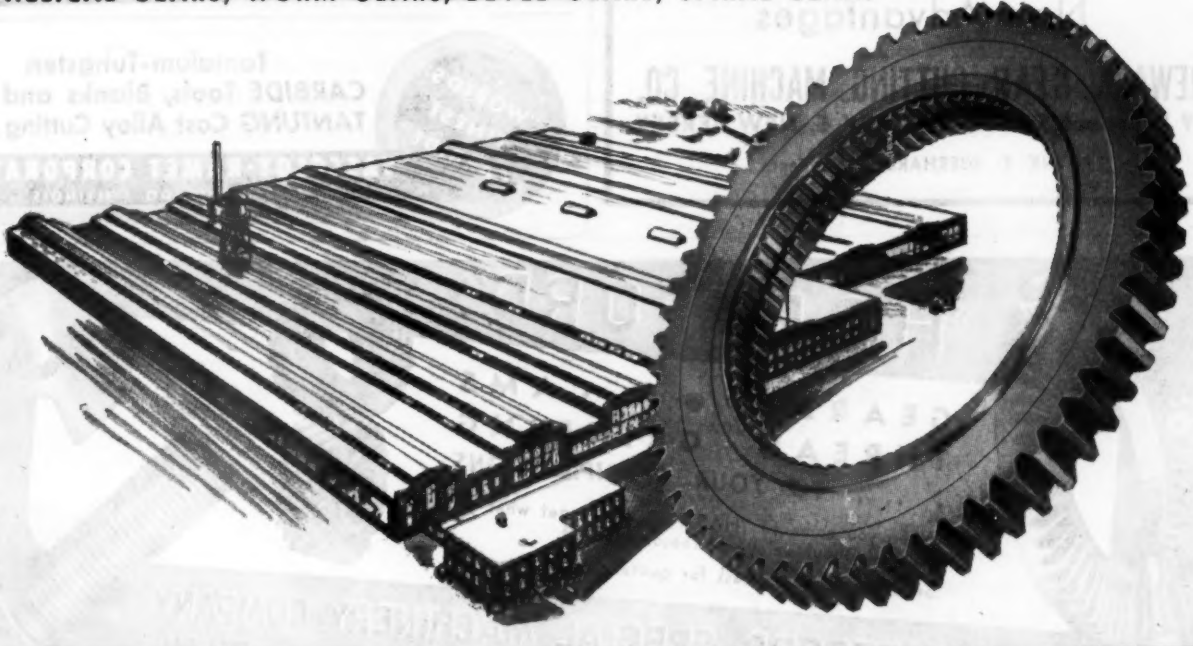
YOU FURNISH THE *SPECIFICATIONS*
WE'LL PRODUCE THE *GEARS!*

Our business is to produce precision gears in quantity to customers' specifications and to meet the delivery schedules agreed upon. Our proficiency in our chosen business is conceded to be high — chiefly because of a policy which was initiated by the management of Perkins before the first gear was finished. ***We like to have our customers consider our plant as a department of their business and work with them on that basis.***

Let us quote on your requirements now!

PERKINS *custom-cut* GEARS

PERKINS MAKES: RATCHETS, SPUR GEARS, GROUND THREAD WORMS, HELICAL GEARS, WORM GEARS, BEVEL GEARS, SPIRAL GEARS



PERKINS MACHINE & GEAR COMPANY • *SPRINGFIELD 2, MASS.*

GRANT GEARS

"When your specifications call for special gears — Spur — Bevel — Mitres — Helical — Worms and Worm Gears — Reduction Units — Why not try GRANT.

You will find GRANT service meeting all requirements of both stock and special gears."

GRANT GEAR WORKS
BOSTON, MASS.

ATLANTIC *for good gears*

Have you a noisy gear train to correct? Try an Atlantic noiseless gear, accurately cut of non-metallic Bakelite.

Atlantic makes gears rigidly to your specifications, proven by precision inspection before delivery. All types, all gear materials, all sizes to 60", all quantities. The same close personal attention to orders, whether it's one gear or a hundred. Send us your specifications or gear samples. Write for the Atlantic stock gear catalog, including chains, sprockets and reducers.

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NEW YORK 12, N. Y.
Phone CAnal 6-1440

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New Design
New Features
New Advantages

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FRANK E. EBERHARDT, *President*

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PROMPT
ECONOMICAL SERVICE
ALL TYPES, MATERIALS
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Tantalum-Tungsten
CARBIDE Tools, Blanks and Dies.
TANTUNG Cast Alloy Cutting Tools.
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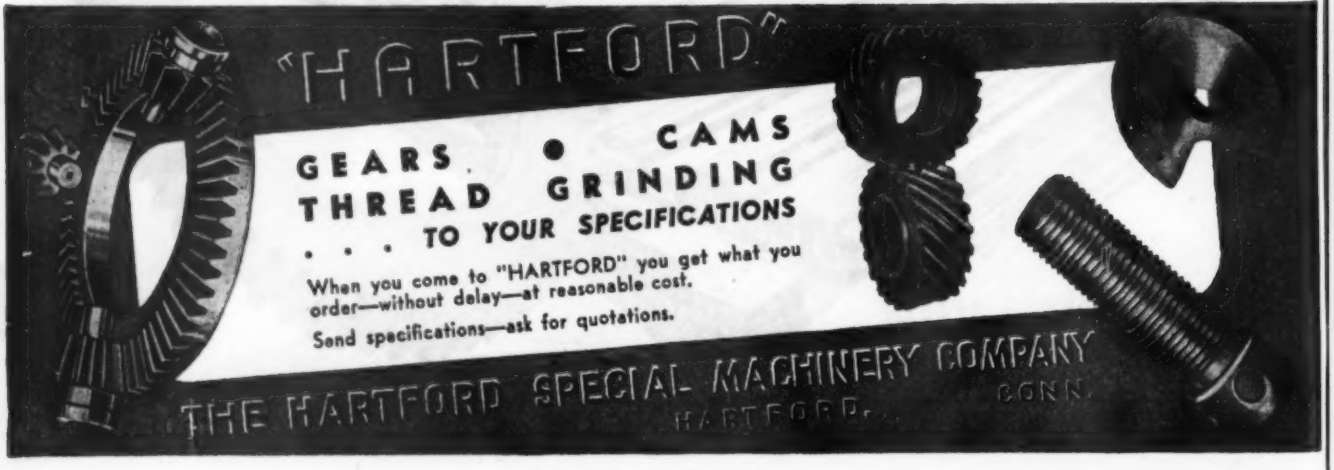
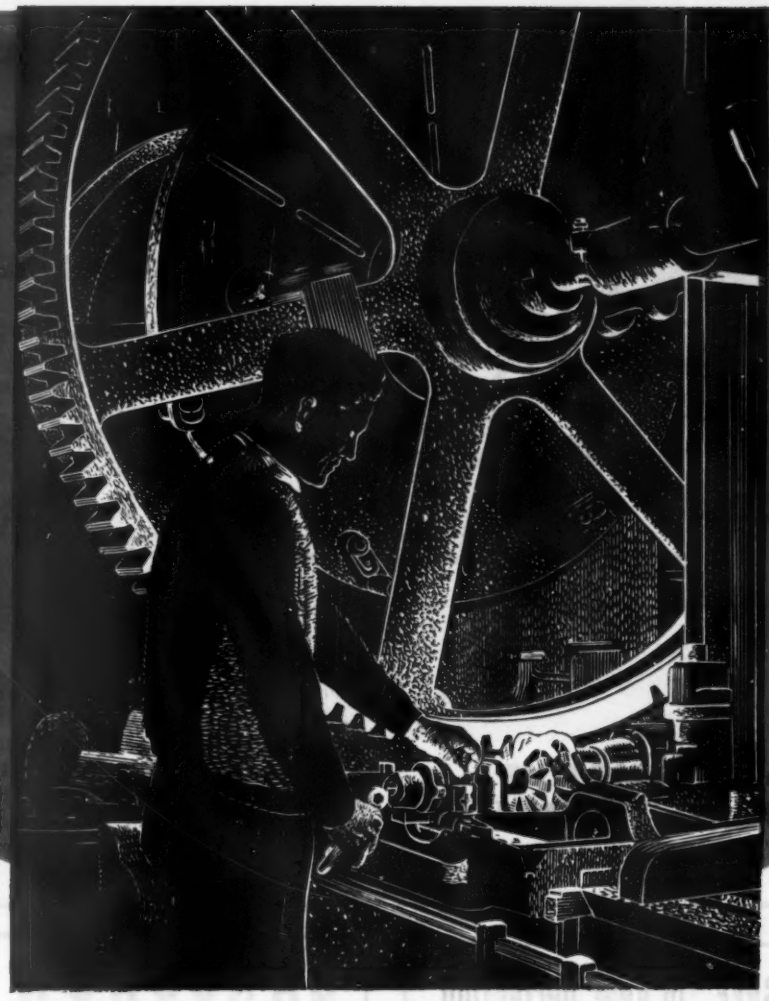
VASCOLOY-RAMET CORPORATION
NORTH CHICAGO - ILLINOIS


"HARTFORD"
GEARS • CAMS
THREAD GRINDING
. . . TO YOUR SPECIFICATIONS
When you come to "HARTFORD" you get what you order—without delay—at reasonable cost.
Send specifications—ask for quotations.
THE HARTFORD SPECIAL MACHINERY COMPANY
HARTFORD, CONN.

"The mark on Finer Gears"



Cutting a large diameter spur gear

We Are Not Motivated by "Profit" Alone!

If financial gain was our sole concern, we would be better in any of several other businesses. The fact is, we like to make gears. Frankly, we have on occasion filled orders for unusual gears that — were profit our only motive — wouldn't have been undertaken. We are not so concerned about "our cut" as we are about whether the teeth on the gears you order are properly cut. This attitude, which has permeated our whole organization, is probably the reason why some of America's largest and most discriminating gear buyers have for so long made "Illlinois" their gear headquarters.

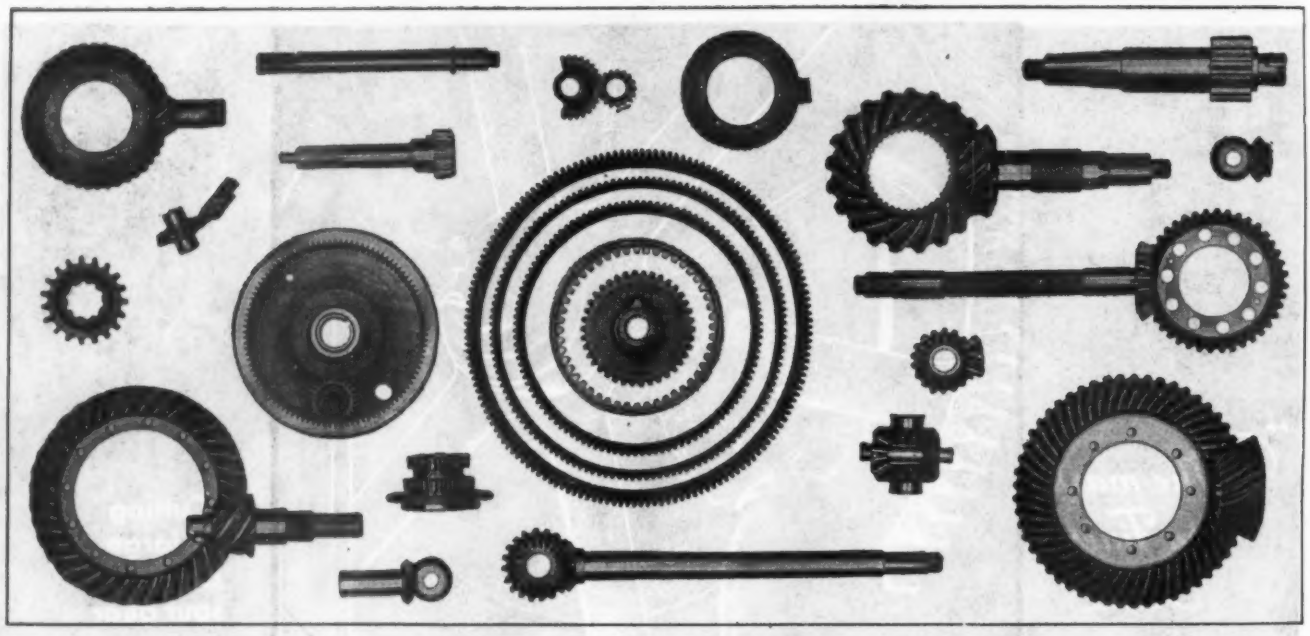
Illinois Gears are "Five Star Gears": ★ Material has been carefully double-checked, ★ All gear cutting is done by highly skilled and experienced craftsmen, ★ Required accuracy is inbuilt, ★ Every gear is double-inspected after completion, ★ Delivery is as promised.

You will find helpful data on gears and details of our production facilities in Catalog 39, sent on request.

ILLINOIS GEAR & MACHINE CO.
Chicago (35) Illinois

ARMY ★★ E ★★ NAVY

ILLINOIS GEAR & MACHINE COMPANY



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DOUBLE DIAMOND GEARS

AUTOMOTIVE GEAR WORKS INC.
RICHMOND, INDIANA

Precision Gears in production quantities for industrial, automotive and farm equipment—built to order or engineered to performance requirements. Automotive Gear Works specializes in BEVEL GEARS, spiral, straight, hypoid and zerol tooth; FLYWHEEL RING GEARS; SPUR GEARS, straight and helical; and GEAR SHAFTS. Your inquiries are solicited—and given prompt attention.

MP

---a "DEGREE" in gear perfection

"Gears by Meisel" . . . These two letters signify thirty-three years of specialization in the art of gear design. They symbolize the *construction of gears for specific purposes* which, by their inherent accuracy, assure the highest possible degree of mechanical perfection. Lay your problem before a MEISEL Gearist to determine the *one* gear suited for your job.

An interesting brochure, entitled "Gear Craftsmanship," will be mailed FREE upon request.

MEISEL PRESS MFG. CO.
946 Dorchester Ave., Boston, Mass.

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FOR SIXTY YEARS

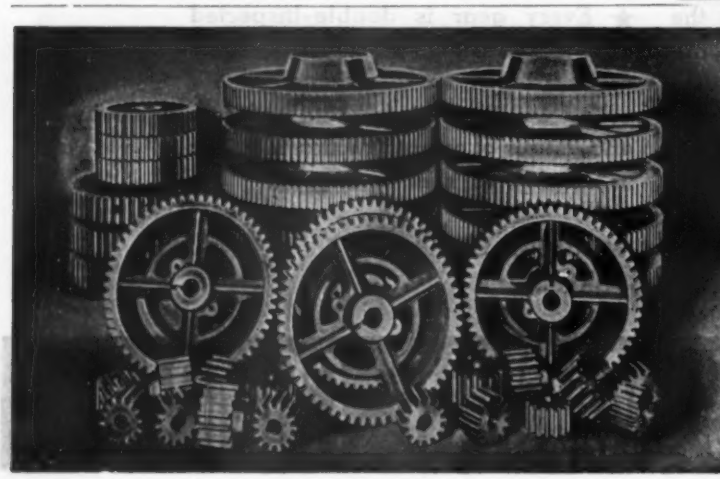
Spur—SPEED REDUCERS—Worm
ALL TYPES OF CUT GEARS

GANSCHOW GEAR CO., 18 N. Morgan St., Chicago

SEND US YOUR PRINTS FOR *Quotations*

GEAR SPECIALISTS — BROACHING
THREAD GRINDING

TAYLOR MACHINE Co.
1917 EAST 61ST ST. • CLEVELAND 3, Ohio



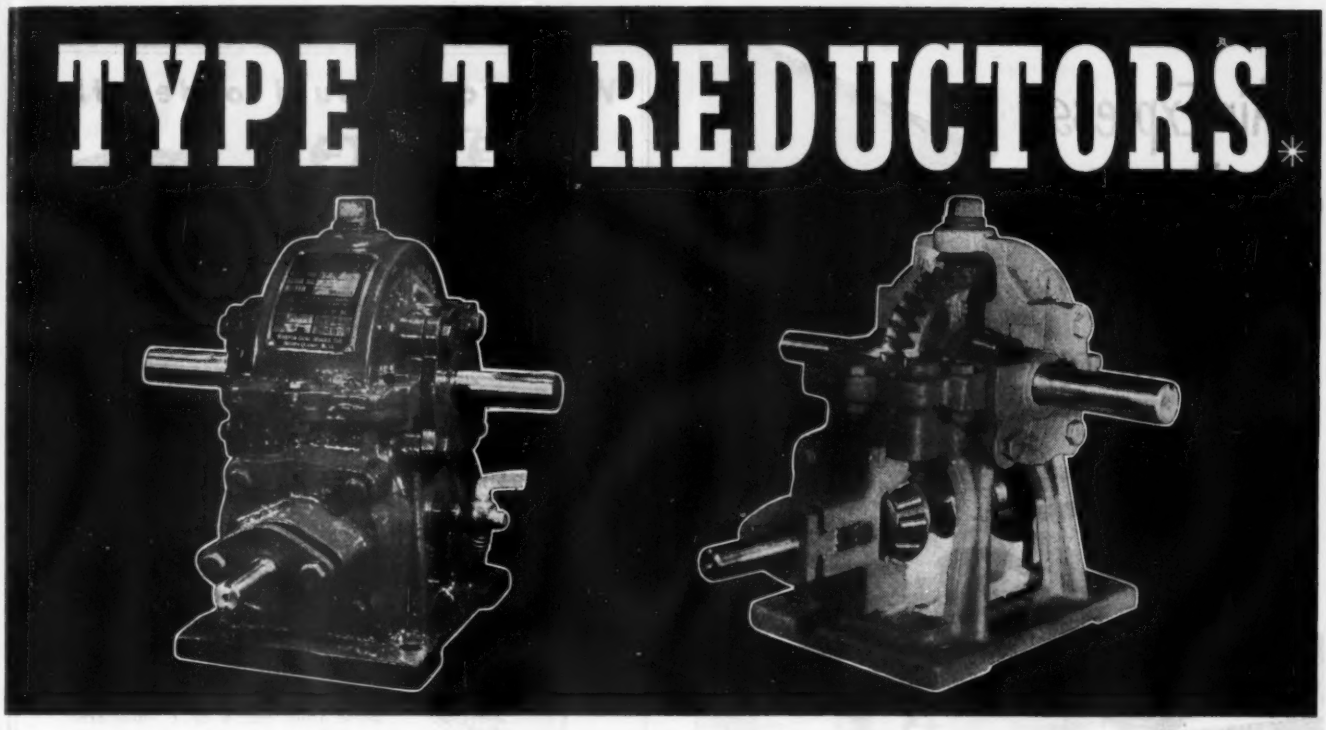
ADAMS GEARS

SPUR — HELICAL — WORM
BEVEL — MITER — RACKS

Splined Shafts A Specialty

THE ADAMS COMPANY
Est. 1883
1942 Bridge St. Dubuque, Iowa

TYPE T REDUCTORS*



Boston Gear Standard Type "T" Reductors (speed reducers) are just one of fifteen types designed and built to provide you with economical and efficient means of speed reduction. They are available in ratios of 9¾ to 1 to 100 to 1 and are rated to carry input loads varying from ¼ to 9 horsepower. All Type "T" Reductors are equipped with phosphor bronze worm gears, hardened and ground steel worms and all shafts are mounted on Timken Tapered Roller Bearings.

Any of the following authorized distributors and direct company branches will be pleased to give you complete specifications and prices of these Boston Gear Standard Type "T" Reductors.

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Kester Machinery Co.
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Power Transmission Equipment Company
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When the Army orders a new piece of equipment — a truck, for instance — things move at breakneck speed. Blueprints, specifications and material specimens shuttle back and forth. Then come tools, jigs, dies. And it's mostly done at 3-mile-a-minute speed via Air Express.

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Shipments travel at a speed of three miles a minute between principal U. S. towns and cities, with cost including special pick-up and delivery. Same-day delivery between many airport towns and cities. Rapid air-rail service to 23,000 off-airline points in the United States. Direct service to scores of foreign countries.

AIR MILES	2 lbs.	5 lbs.	10 lbs.	25 lbs.
250	$1.04	$1.25	$1.57	$2.63
500	$1.11	$1.52	$2.19	$4.38
1000	$1.36	$2.19	$3.74	$8.75
2500	$1.68	$4.20	$8.40	$21.00

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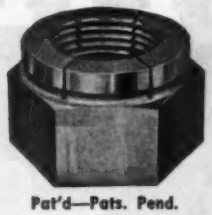

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Patents Applied for

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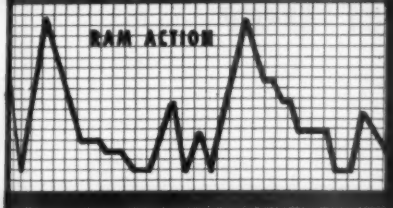
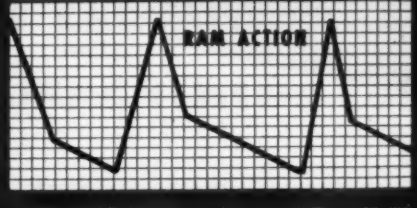


2 "Multi-Speed" MULTIPRESS offers rapid approach of ram to work, and adjustable pressing speed. Fully depressing the control levers brings the ram to the work at a speed of 200 ipm. Slightly raising the levers slows the ram at once to any pre-selected pressing speed between 20 and 200 ipm. A simple knurled-knob and lock-nut permit easy and accurate pressing speed adjustment. Thus, Multi-Speed means faster production and ability to adjust pressing speed to the characteristics of the material being processed.



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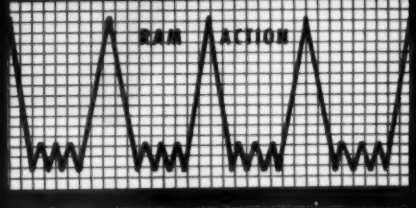

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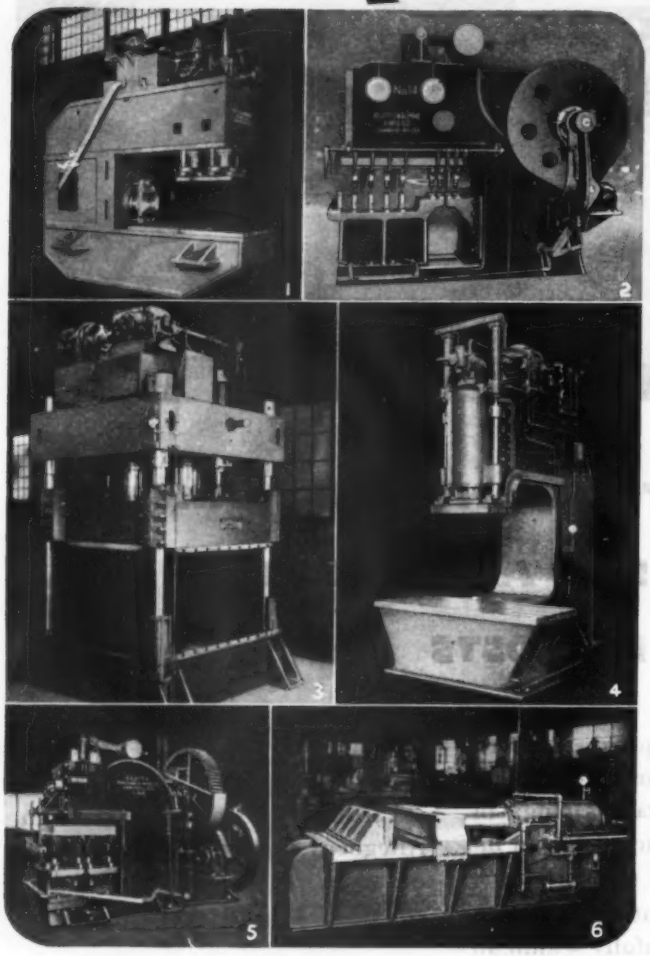

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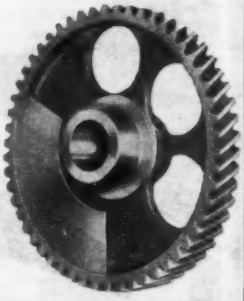

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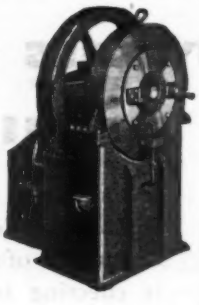

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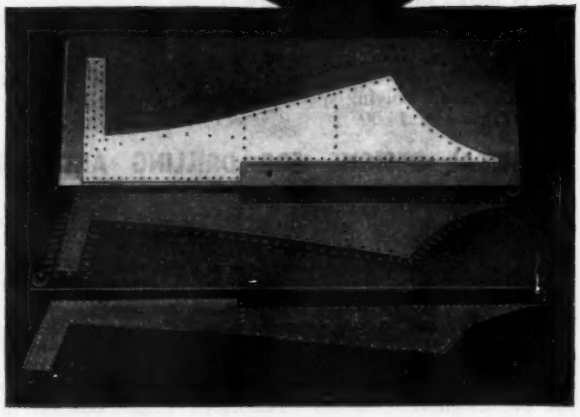

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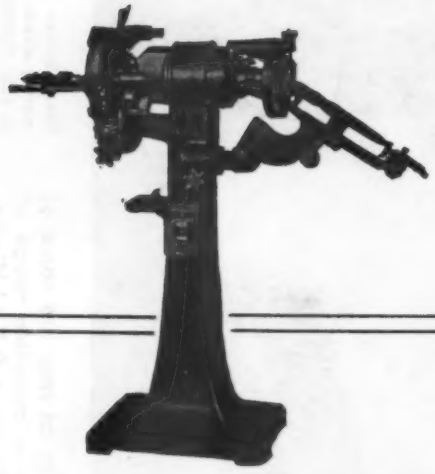

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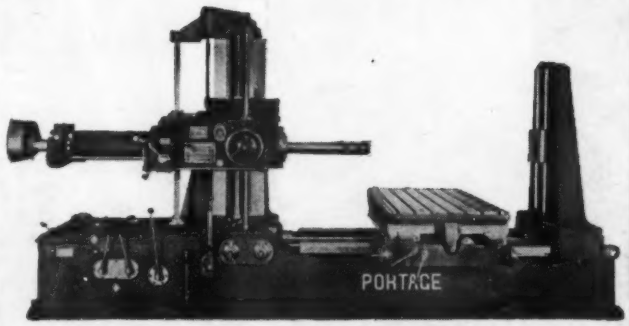

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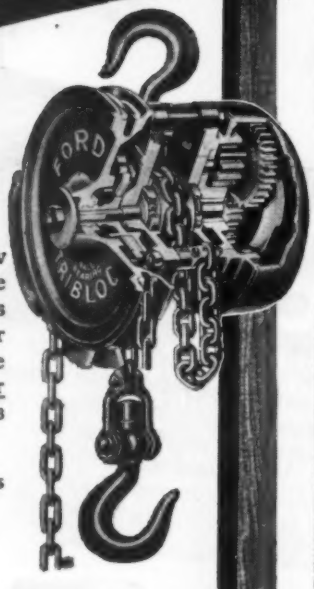

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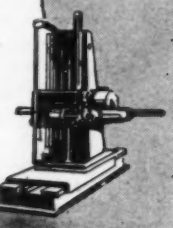

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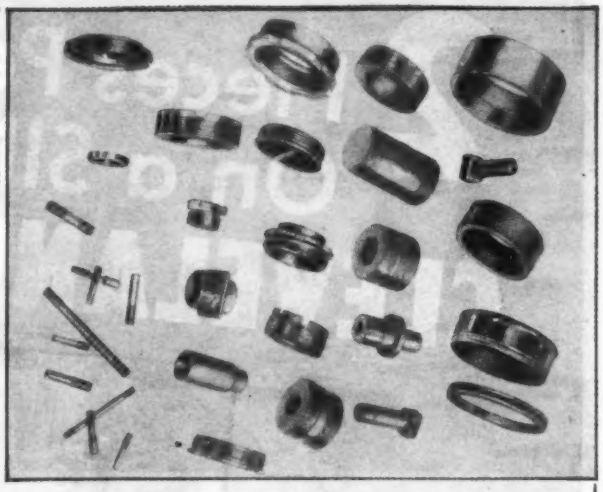

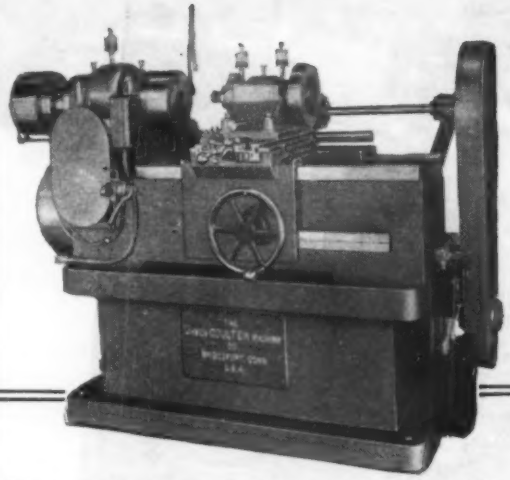

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This modern machine can be depended on to produce and duplicate close tolerance threaded parts. With the exception of loading, all operations are fully automatic. Any parts that can be held in a Universal chuck, air-operated chuck or special fixture can be threaded, on the COULTER, internally or externally, either right or left hand.

Work can be inserted from either face or rear end, through large hole in work spindle, thereby making possible the threading of shaft ends, tubing or other long work.

Individual Motors on the COULTER for work and cutter spindles provide a wide range of speeds and feeds for handling such materials as brass, aluminum or steel.

THE JAMES COULTER MACHINE CO.
BRIDGEPORT, CONNECTICUT

Better finishing and more of it . . .
. . . assured by the "PRODUCTION" No. 101 Centerless Feed POLISHING MACHINE

This machine—for cylindrical work—is regularly furnished with our Belt Type Centerless Feed. It can also be used for taper cylindrical work when furnished with our Patent Centerless Feed of the Roll Type.

It is substantially built and equipped with easy wheel adjustment, truing device, and adjustable work support. All parts are readily accessible. Regular pulleys give spindle speeds of 2398 and 2088 R.P.M. Other speeds are also available

Send for illustrated literature

PRODUCTION MACHINE CO.
Manufacturers of Drilling Machines, Tool Grinders and Hand and Automatic Polishing and Grinding Machines.
GREENFIELD, MASS., U. S. A.

ACCURACY *at it's* **BEST!**

"To the Tenth!"

PIECE AFTER PIECE ...HUNDRED AFTER HUNDRED...ACCURACY AT IT'S BEST! REID GRINDERS ARE BUILT TO PRODUCE THAT RESULT...CLOSE TOOL ROOM WORK OR GANG-UP PRODUCTION ARE AT YOUR FINGER-TIPS ON

SURFACE **REID** GRINDERS

REID BROTHERS CO., INC. BEVERLY, MASS.

SEND FOR CATALOG AND PRICE LIST TODAY.

BIG MOTOR CAR MFR. USES 16 GEMCO Shapers!

...Has Re-ordered Over Period of 7 Months, for 7 Different Plants!

GEMCO

Multi-Purpose SHAPERS

In 16", 20", and 24" Sizes

Check These Outstanding Features:

- ✓ Sturdy, powerful construction;
- ✓ Utmost precision in workmanship and performance;
- ✓ Materials of highest qualities;
- ✓ Dependability under continued severe service;
- ✓ Modern simplicity in design;
- ✓ Ease and convenience in operation;
- ✓ Unique, essential safety features;
- ✓ Advanced type of force feed lubrication.

Exclusive
"LUBRIGARD"
SAFETY DEVICE
Increases the Precision Life

Write today for Bulletin GC-12M

GENERAL ENGINEERING & MFG. CO.

SAINT LOUIS 4, MISSOURI

Manufacturers of **PRECISION MACHINERY** *Since 1917*

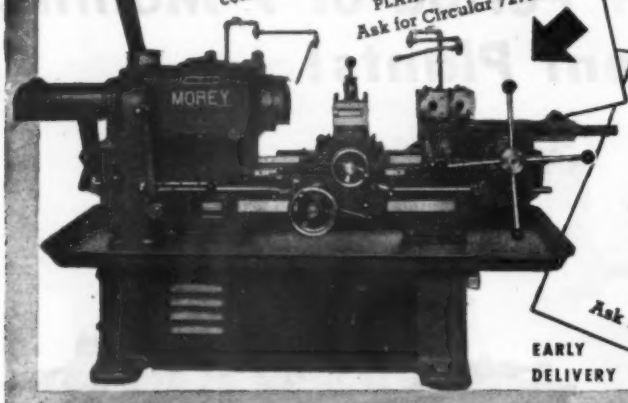
MOREY TURRET LATHES
for BAR or CHUCKING { UNIVERSAL or PLAIN

3 UNIVERSAL
For bar stock up to 1½" in diameter
10" turning length
16½" swing over bed
Infinite spindle speeds: 55 to 1800 RPM. constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 727A

2 PLAIN-GEARED
For bar stock up to 1" in diameter
Turning length 6½"
Swing over cross slide 6"
Swing over bed 14"
Infinite spindle speeds:
Minimum of 60 RPM.
Maximum of 2000 RPM.
Constant horsepower at all speeds.
Ask for Circular 629A

4 UNIVERSAL
For bar stock up to 2" in diameter
12" turning length
19½" swing over bed
Infinite spindle speeds: 35 to 1500 RPM, constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 736A

EARLY DELIVERY



- INFINITE SPINDLE SPEEDS —Electrically Selected—
- DIRECT BELT DRIVE AVAILABLE AT HIGH SPEEDS ELIMINATES GEAR MARKS (patents applied for).
- GEARED SPINDLE SPEEDS INSTANTLY AVAILABLE THROUGH MULTIPLE DISC CLUTCHES.
- SPINDLE MOUNTED ON TIMKEN BEARINGS.
- RIGID—WITH SUFFICIENT POWER TO TURN AT THE HIGHEST SPEEDS AND FEEDS MODERN TOOLS WILL WITHSTAND.
- SPINDLE SPEEDS AND POWER FEED CHANGES WITHIN EASY REACH OF OPERATOR.

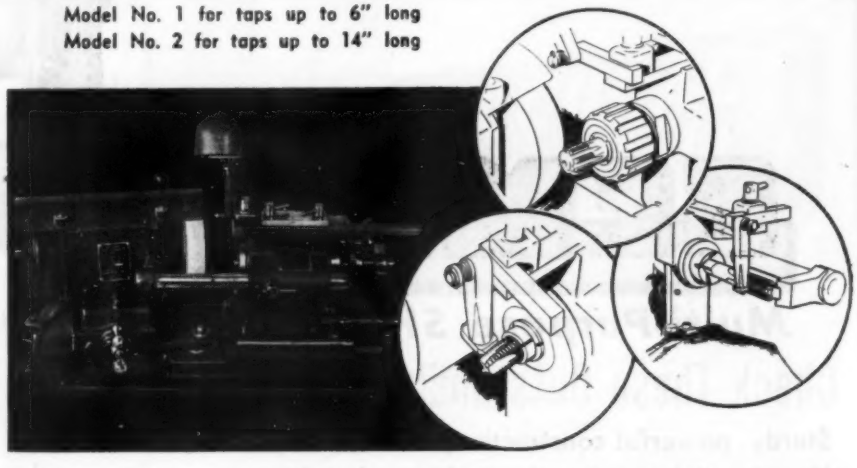
ARMY E NAVY

THE DESIGN OF THE MOREY No. 2, 3 and 4 TURRET LATHES ARE BASICALLY ALIKE. EACH MACHINE IS ENGINEERED FOR THE SIZE WORK IT IS DESIGNED TO HANDLE.

DESIGNED AND BUILT BY
MOREY MACHINERY CO., INC
410 BROOME STREET, NEW YORK 13, N. Y.
PLANT: 4-57 26TH AVE., ASTORIA 2, NEW YORK

Model No. 1 for taps up to 6" long
Model No. 2 for taps up to 14" long

S-T-R-E-T-C-H TAP LIFE WITH A
BLAKE
TAP GRINDER



Never let a tap get dull! Broken taps, scrapped work and lost time always result. *Keep* taps sharp on a Blake Tap Grinder! Here is a machine that is not only economical to buy and use, but S-T-R-E-T-C-H-E-S the life of every tap. The Blake keeps taps sharp on the chamfer, thus the taps become progressively shorter but maintain size and thread form throughout their life. Many Blake users report tap life increased ten to twenty times and more.

The Blake Tap Grinder will sharpen either right- or left-hand taps with any amount of relief desired, and this can be done on any tap with 2, 3, 4, 5, 6, 8, or 10 flutes from No. 0 to 2".

No machine is better than the cutting edge of the tool it uses.

EDWARD BLAKE COMPANY

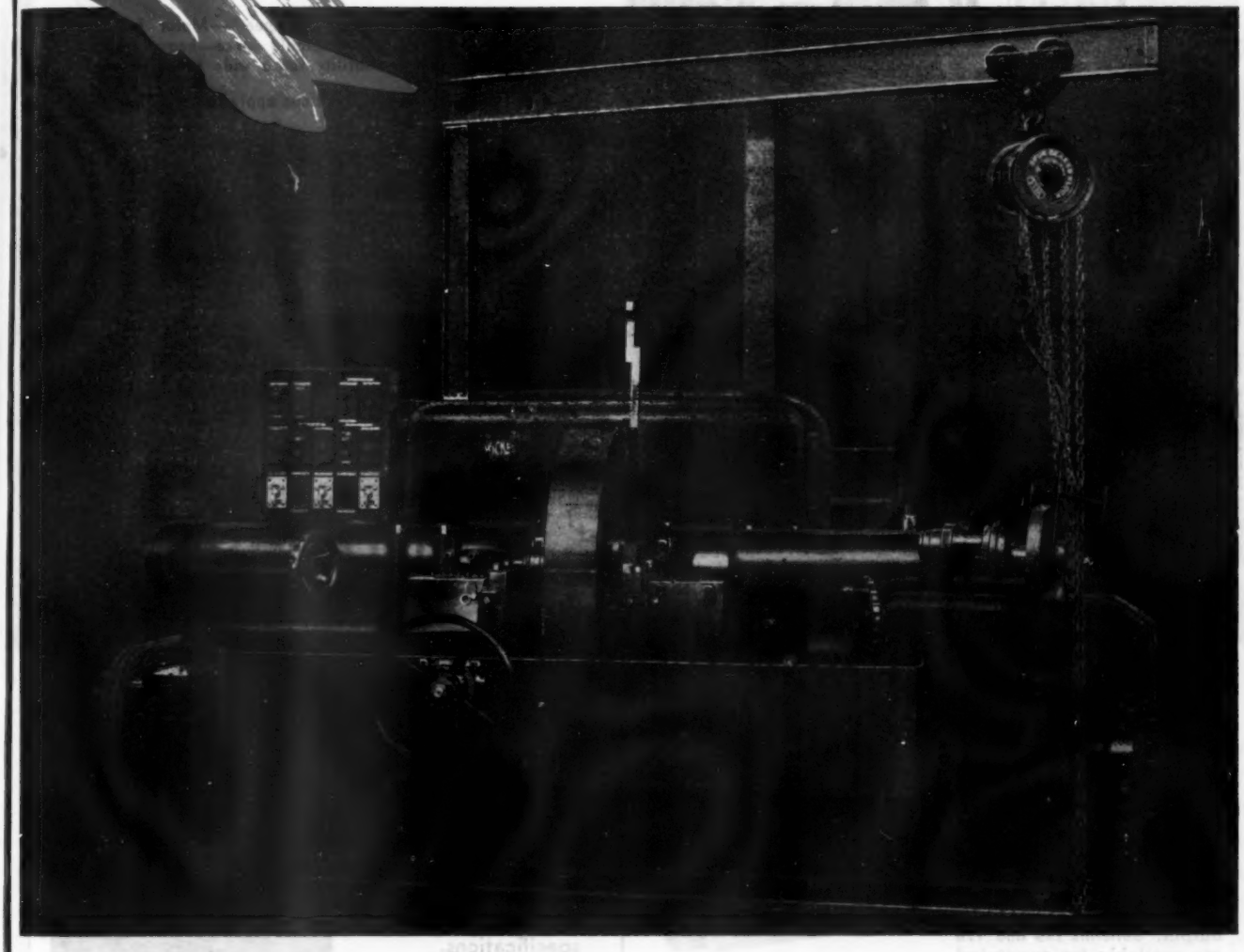
634 COMMONWEALTH AVE.
NEWTON CENTRE 59, MASS.

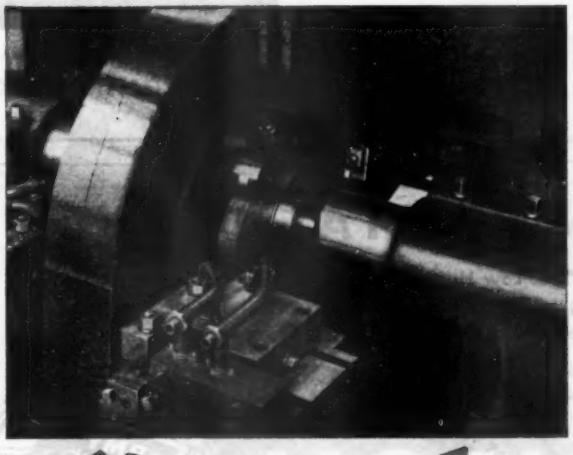
BLAKE TAP GRINDERS—FILTAIRE PORTABLE DUST COLLECTORS—AMERICAN TOOL HOLDERS—BLACK DIAMOND PRECISION DRILL GRINDERS—WALTHAM CUTTER SHARPENERS

Please send me Bulletin No. 544 which describes the Blake Tap Grinder in detail.
A.M.

Name..... Title.....
Company.....
Street.....
City..... State.....

WICKES AUTOMATIC
CENTER DRIVE CRANKSHAFT LATHE





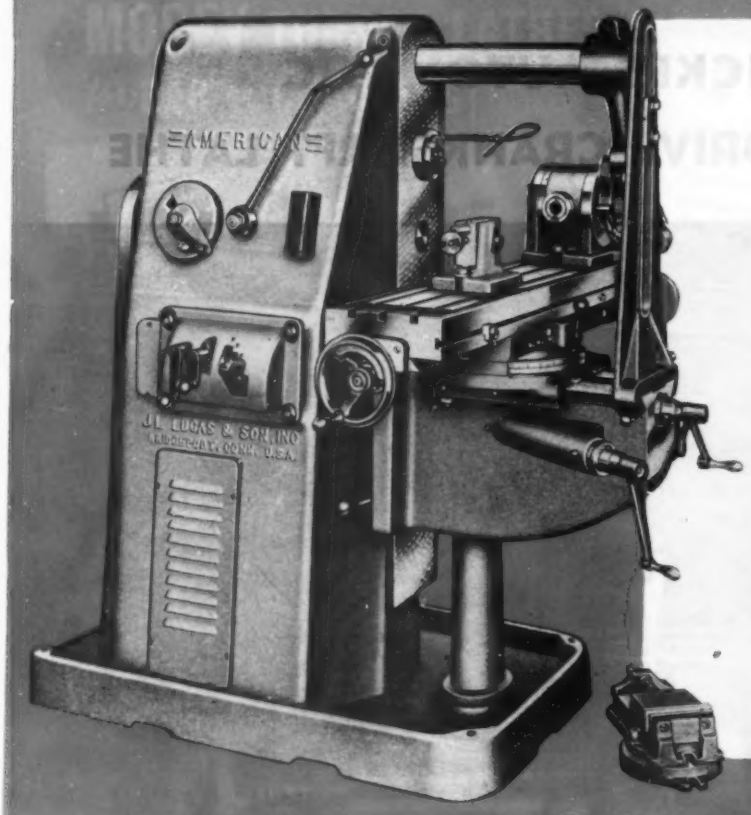
This efficient new Wickes Model CH-8 Automatic Center Drive type lathe is ideal for machining the main line bearings, stub-end, flange and oil slinger complete on crankshafts for airplane, truck and tractor both gasoline and Diesel engines. By setting up duplicate lathes, the second tooled for finish turning the same parts, you can save considerable time and labor by eliminating rough grinding operations.

View above shows lathe with loading device. View at left shows tooling for machining rear end of two throw crankshaft.

Entire operation is automatic and controlled by an electrical push-button panel. Write today for complete facts about this and other Wickes automatic lathes.

Wickes Lathes CUT COSTS • SPEED PRODUCTION

WICKES BROTHERS • SAGINAW, MICHIGAN • EST. 1854



EXPLORE THE POSSIBILITIES of the No. 2 AMERICAN PLAIN and UNIVERSAL MILLING MACHINE ON YOUR WORK

Offering infinite spindle speeds—Motor in base drive—Standardized spindle nose—heavy rugged construction—versatility for a wide range of work.

The following specifications apply to both Plain and Universal Types

TABLE—Working Surface—46"x10½"
T-slots—3-11/16"

RANGE—Longitudinal Power Feed—25"
Transverse Power Feed—9"
Vertical Hand Feed—17"
Max. Distance spindle to table—17"

SPINDLE—Standardized Flanged Nose—No. 40 Taper
Hole through spindle—21/32" dia.
Length Front Bearing—5"
Speeds—Infinite—Range 25-500 RPM

FEEDS—16

OVERARM—Dist. to center of Arbor—6½"

FLOOR SPACE—85"x68"

Prompt Deliveries Now Available

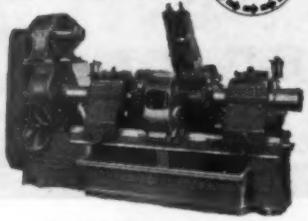
Send for illustrated literature—

J. L. LUCAS & SON, Inc.
BRIDGEPORT, CONN.

Horizontal ROTO-MATICS

DAVIS and THOMPSON Roto-Matic

When high production is in demand on your machining problems your requirements can be met with a Horizontal Roto-Matic. Continuous, non-indexing operation together with roughing and finishing spindles insure maximum output. ***Bulletins 110 and 120*** are available for suggested solutions to your problems.



No. 1-A Continuous Rotary Drum Type Miller

Davis and Thompson Co.
Mfrs. of Machine Tools and Micrometers
6411 W. Burnham St. Milwaukee 14, Wisconsin

UNIVERSAL *Horizontal Boring Machine*

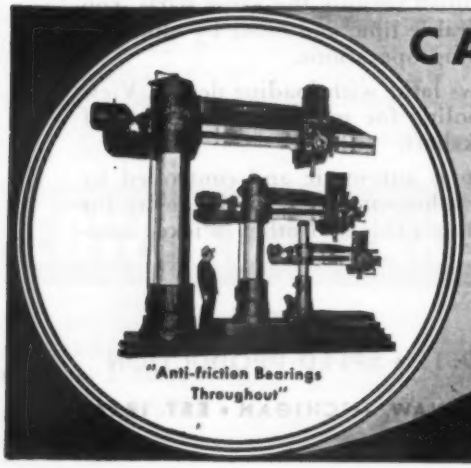
The only TRIWAY *Boring Machine Built*

Made in 3" and 4" spindle sizes. Write for complete, detailed specifications.

Standard Universal 3" Spindle Machine

UNIVERSAL BORING MACHINE CO.
Hudson, Mass., U. S. A.

CARLTON RADIAL DRILL



"Anti-friction Bearings Throughout"

FEATURES—1. Low Hung Drive to the Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at all speeds. 4. Concentrated and Convenient controls. 5. Constructed on Unit Principal.

The **CARLTON**
MACHINE TOOL COMPANY
CINCINNATI, OHIO, U. S. A.

ARMY E NAVY

Versatile . . .

FOR BOTH PRODUCTION AND TOOLROOM JOBS!

That's the

COVEL No. 15

SURFACE GRINDER

(6"x 18")

On a typical precision job, the COVEL No. 15 is shown here grinding clutch teeth. The work-holding fixture is hand-operated, moves the clutch blank around as each cut is finished. Work table is 6"x18", ample to hold most work pieces suitable for this type grinder. Table moves up to work. Wheel cannot fall into work and ruin the finish

Most plants today need a hand-feed precision Surface Grinder built for double duty—on the production line and in the toolroom. And that's the spot the COVEL No. 15 is designed to fill!

Quick set-ups and simple hand control reduce operating time to a minimum. Change-over from one job to another can be made quickly and easily—a feature that means bigger profits on short runs for you!

Toolroom savings result because of the wide range of uses and accuracy of the COVEL No. 15. Tolerances of tenths of thousandths are everyday standards for this reliable machine—your assurance of precision workmanship on such intricate work as dies, threading chasers, V blocks and angular bars. Find out more about this versatile Surface Grinder and how it can pay its way in your plant. *Write for Bulletin A185 today.*

GRINDING MACHINERY SINCE 1874

COVEL INDUSTRIAL GRINDERS

COVEL MFG. CO., BENTON HARBOR, MICHIGAN U. S. A.

W. F. and JOHN

BARNES 924 *Vertical*

DRILLING, BORING AND FACING MACHINE

Machine for drilling 43 ¾"-holes in cast armor plate.

A BASIC MACHINE THAT CAN BE TOOLED AND ADAPTED TO MANY TYPES OF HIGH PRODUCTION JOBS REQUIRING UP TO 60 H. P. AND 50,000 LB. THRUST

★Design and construction features of this machine make it highly suitable for mass production drilling, boring, facing and reaming — especially on those jobs requiring wide-area heads. Unusually slow feeds are obtainable for heavy facing work by simple adjustment on the hydraulic unit mounted on the side of the column.

The heavy, cored column casting with 24" ways carries the head saddle and head which are counterbalanced by easily-accessible weights. The control bar with adjustable dogs for governing the head travel — and the way lubricator are mounted on the head saddle.

The illustrations below show how we have adapted the 924 Machine to a variety of high production jobs.

Write for additional information — ask for bulletin No. 245.

ILLUSTRATIONS BELOW

1. Twin-column machine for multiple drilling and reaming 72-¾" dia. steel plate. Arranged for index table.

2. Machine for rough and finish boring and turning rabbet on tank part.

3. 18-spindle 4-station machine with tapping unit — drills, reams, spotfaces, and taps tractor track links.

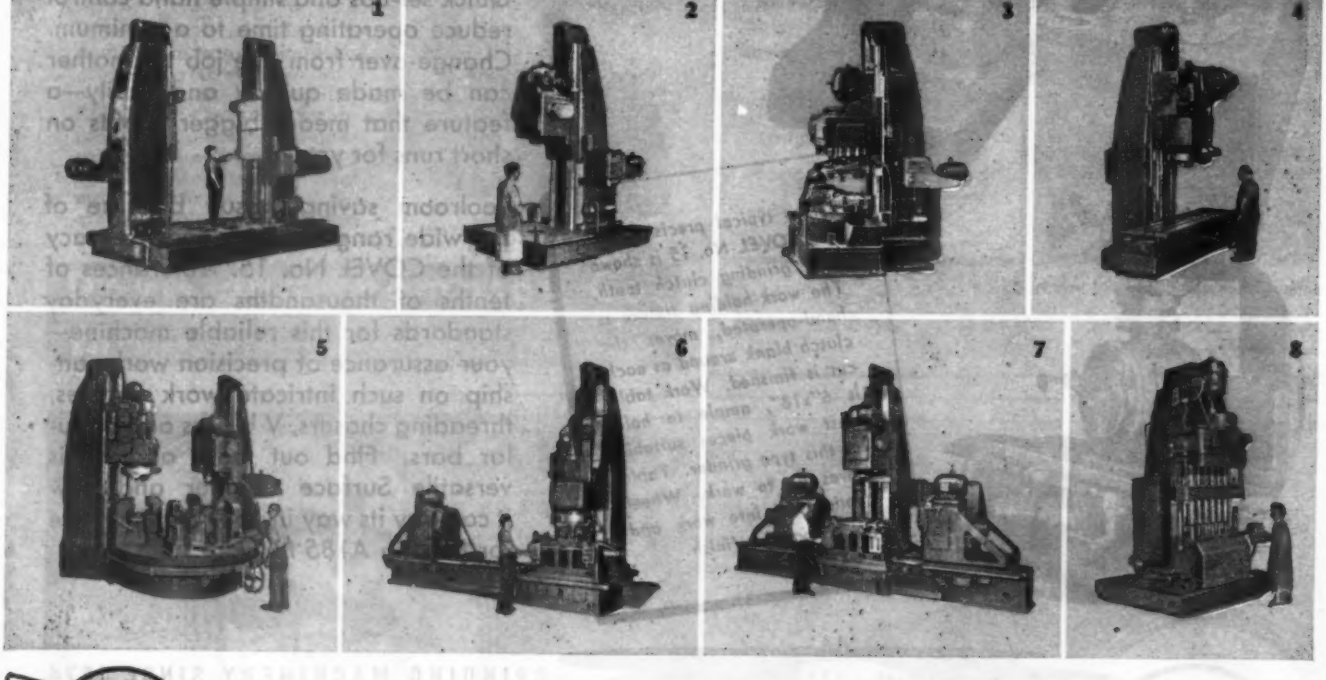
4. Boring and facing machine with dual-hydraulic head and 100" x 28" table. Will handle up to 30" facing operations.

5. 3-station machine with 108" index table, rough and finish bores and faces rear axle housing.

6. Armor plate tank differential carrier is finish faced and line bored on this machine.

7. Machine for bump facing 22" dia. and rough boring steel tank part.

8. Machine for rough and finish boring, counterboring, back counterboring and chamfering sleeve seats in motor block.

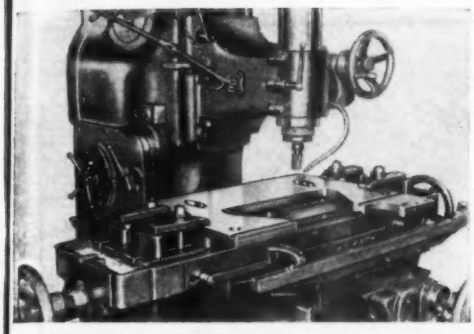


W.F.&JOHN BARNES

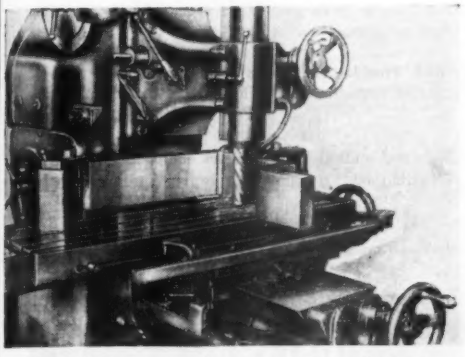
Special MACHINE TOOLS FOR DRILLING, REAMING, TAPPING, BORING, FACING, MILLING AND HONING OPERATIONS

W. F. and JOHN BARNES

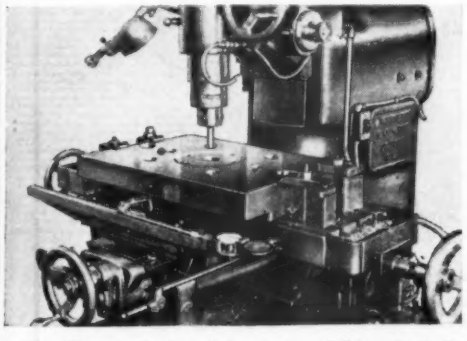
310 SOUTH WATER STREET • ROCKFORD, ILLINOIS, U.S.A.



• On the large one-inch steel plate, many operations were performed at one setting, including profiling, milling, boring, slotting, and keyway cutting. KNIGHT Miller's wide range of spindle speeds, solid table unit, and ease of handling provided efficient production and accurate results on all of these operations.



• Illustration shows a large forging on which a two-inch diameter cutter, six inches long, was used to remove as much as five-sixteenths inch of stock in some places without appreciable spindle deflection. The forging was machined completely all over and met with rigid inspection for finish and tolerances. A good, stiff job for any vertical miller and the KNIGHT took it.



• Handling a boring job on an eighteen-inch by twenty-nine inch plate, two inches thick. Nine holes, ranging from one and one-eighth inches to two-inches diameter, were accurately bored to limits of plus or minus .0005". Dial indicators for quick and accurate locating, a large accurately fitted spindle to insure round and straight holes, and table slides that are square made the KNIGHT Miller ideal for the job.

KNIGHT

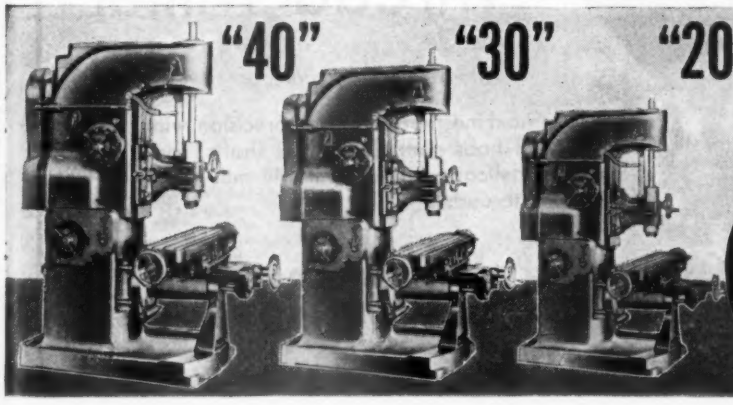
UNIVERSAL VERTICAL MILLERS COMBINE

VERSATILITY
SPEED
ABILITY
RIGIDITY
ACCESSIBILITY
ECONOMY

FOR A WIDE RANGE OF OPERATIONS

Milling . . . Recessing
Boring . . . Shaping
Drilling . . . Routing
Turning . . . Backfacing
Surfacing . . . Slotting
Counterboring . . . Profiling

And you have the advantage of changing quickly from one job to another—at all times you are equipped for unusual capacity. Where speed and convenience are required, KNIGHT Millers deliver—where power and rigidity are required, KNIGHT Millers are fully able and give you more efficient operation, faster manipulation, and quicker set-ups.

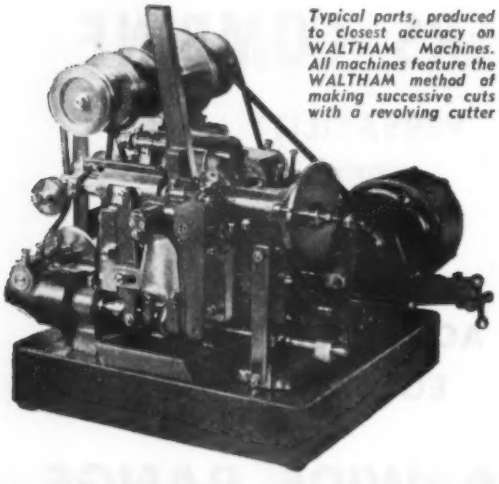


KNIGHT VERSATILE MILLERS ACCURATE-RIGID

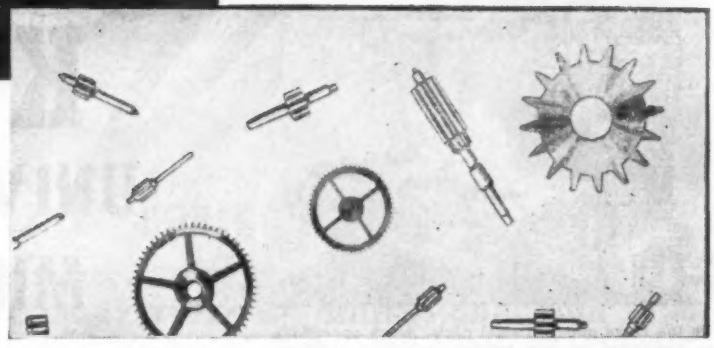
W. B. KNIGHT
MACHINERY COMPANY
St. Louis 8, Mo.

WALTHAM
PINION & GEAR CUTTING MACHINES

for precision production of fine pitch mechanisms



Typical parts, produced to closest accuracy on WALTHAM Machines. All machines feature the WALTHAM method of making successive cuts with a revolving cutter



Single-Cut Pinion Machines This machine employs one cutter. Blank is positioned and machine started by hand, all other movements being automatic.

Multiple-Cut Pinion Machines Two or three cutters on arbor of cutter spindle make successive cuts. Machine stops on completion of last cut.

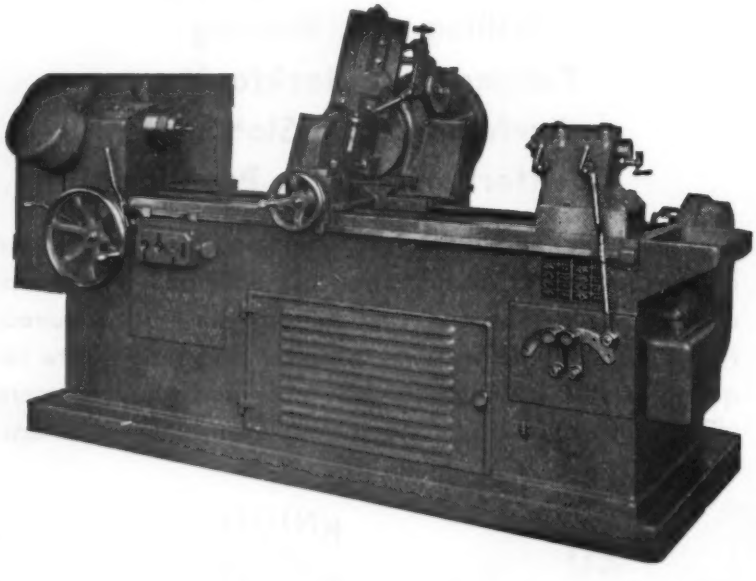
Magazine-Fed Pinion Machines Provides continuous production of one kind of pinion. Magazine is loaded and all other operations including cutting and ejecting are automatic and continuous.

Gear Cutting Machines Single and Multiple cut machines equipped with special cutter swing provide the means of cutting teeth on gears up to 1½" pitch diameter and in a stack ¾" to 1" long.

Write for literature giving detailed specifications

WALTHAM MACHINE WORKS
WALTHAM, MASS.

WALTHAM
TRADE MARK REGISTERED U.S. PAT. OFF.



The ADAMS Gear Hobber and Thread Miller

The Adams Manufacturing Hobber is available when there is a sufficient volume of splined shaft and spur gear hobbing to warrant the purchase of equipment for these operations only.

Here is a machine that combines precision with versatility. It hobs multiple splined shafts, spur gears and helical gears, and it will mill worm and screw threads.

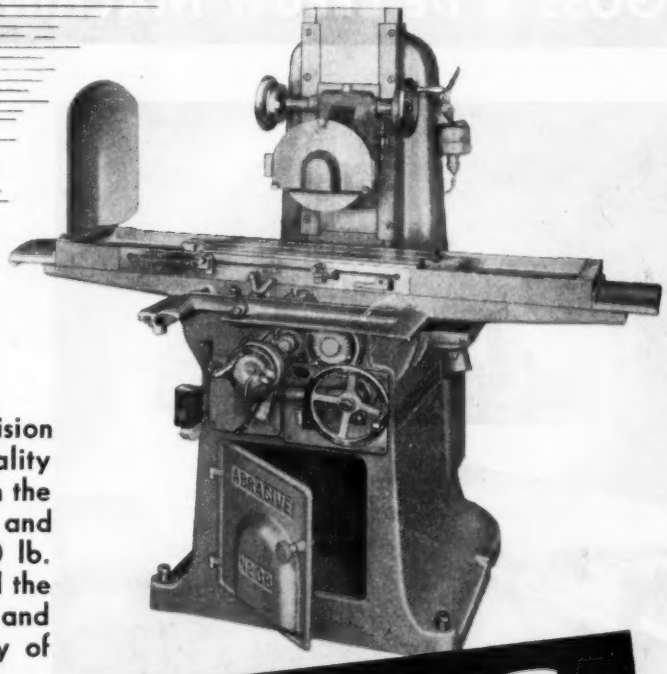
THE ADAMS COMPANY

1905 BRIDGE STREET
DUBUQUE, IOWA, U.S.A.

1883 — Our 62nd Year — 1945

ABRASIVE 3-B SURFACE GRINDER

A Damascus blade was an unsurpassed weapon in the hands of an old-time knight. The Abrasive No. 3-B Surface Grinder today inspires similar confidence; it welcomes difficult tasks and performs them superbly well.



The ABRASIVE No. 3-B Surface Grinder, precision built in every detail produces work of highest quality . . . it handles work of many shapes and sizes on the production line, grinding intricate parts, tools and gauges to very close limits. The massive 1600 lb. bed casting reduces vibration to a minimum and the heavy alloy steel spindle — hardened, ground and lapped — contributes to the extreme accuracy of this efficient grinder.

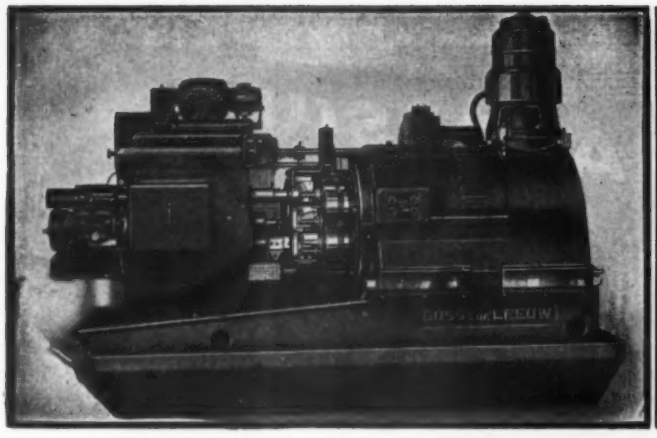
Write for Bulletin

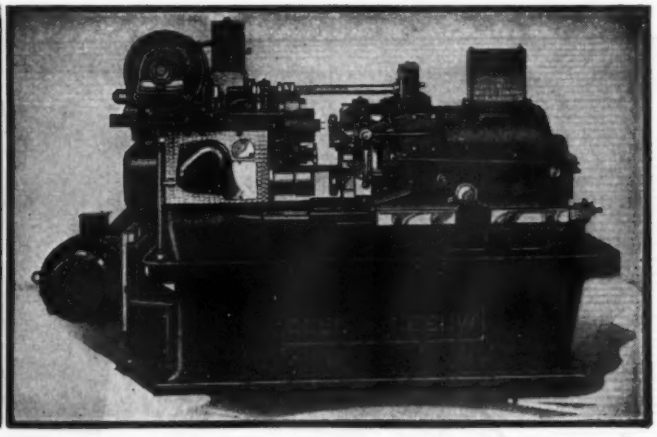
Consult the Government Machine Tool Surplus Lists for ABRASIVE Machines to replace your obsolete equipment. We will gladly supply information on these models if you will send the machine serial numbers, and we will endeavor to provide attachments, accessories and repair parts as required.

ABRASIVE

ACCURACY BOOSTS PRODUCTION

ABRASIVE MACHINE TOOL COMPANY • EAST PROVIDENCE 14, RHODE ISLAND





WORK ROTATING TYPE

5 Spindles
6 Spindles
8 Spindles

GOSS & DE LEEUW *Multiple Spindle* CHUCKING MACHINES

TOOL ROTATING TYPE

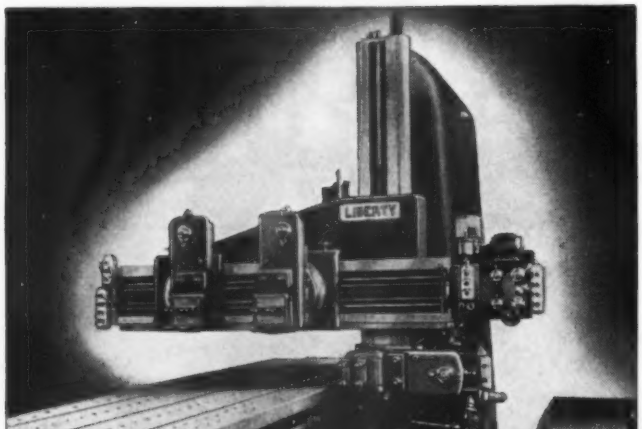
4 Spindles
5 Chucking Positions

On these machines, two threading operations can be handled simultaneously, each thread controlled by its own lead screw.

Among the many other modern features offered in both types are: pre-loaded anti-friction spindle bearings, hardened ways, oversize spindles and gears of chrome-nickel steel, heat-treated.

Complete details will be found in descriptive catalog available on request.

GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.



LIBERTY

SMALL, MEDIUM AND HEAVY DUTY

PLANERS

FOR HIGH SPEED, LOW COST PRODUCTION

LIBERTY PLANERS • HAMILTON, OHIO, U. S. A.

Over a Quarter-Century of Specialized Experience with Time-Tested Principles of Design

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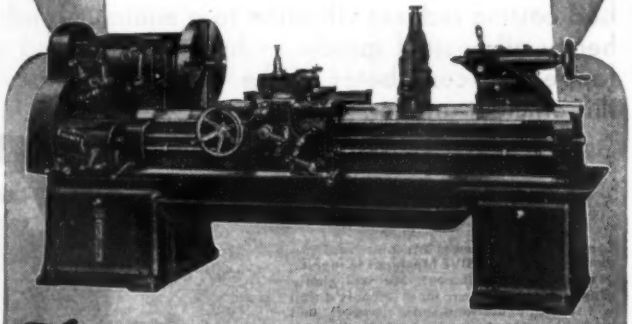
Metalmaster

12", 14" & 16" LATHES

Offer: Infinite range of threads and feeds. Easy gear adjustment. Independent motor mounting. Short, direct drive. One control for all threads. Ample power for heaviest cuts. Automatic stop for feeds.

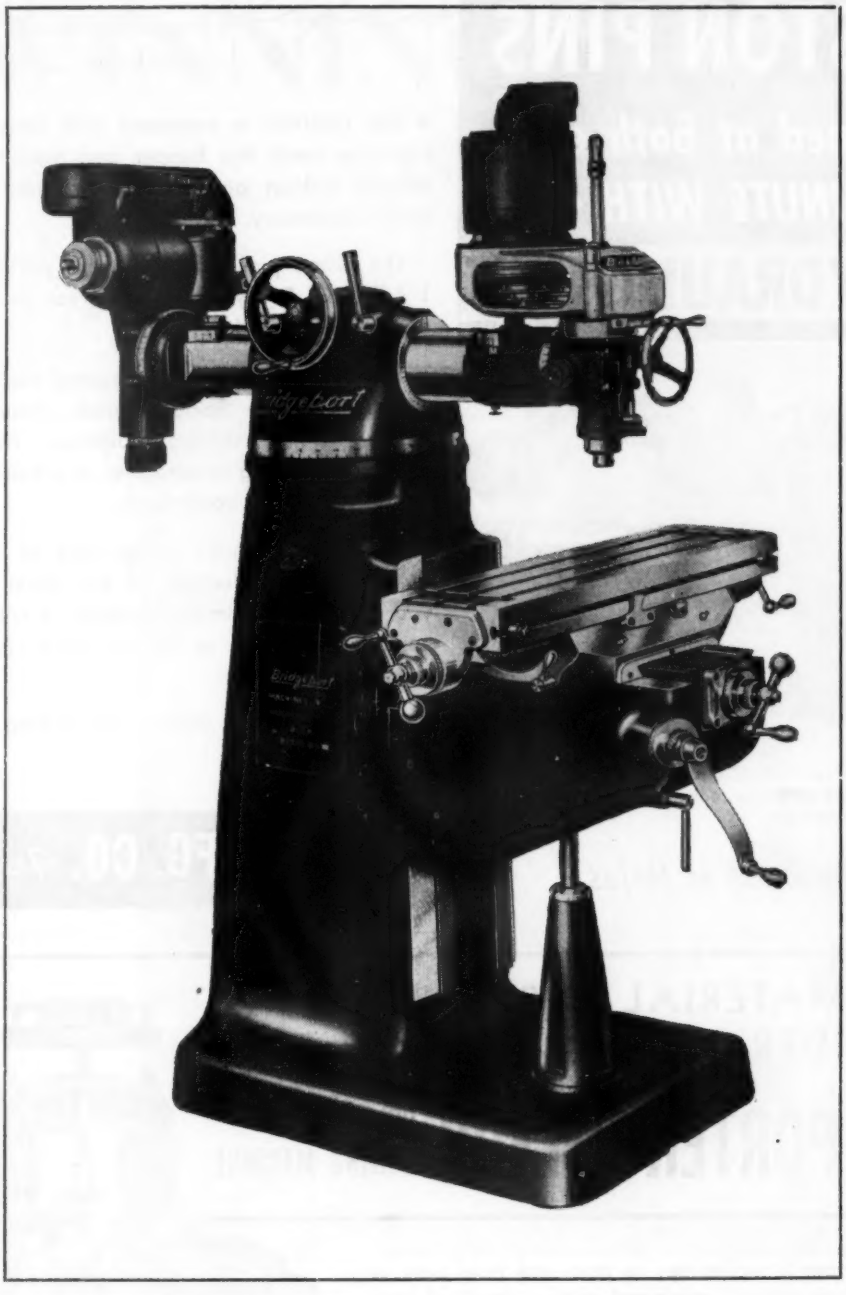
Catalogs sent on request. Write for yours!



The **BRADFORD MACHINE TOOL Co**

MANUFACTURERS OF METAL WORKING LATHES; CAM FEED DRILLING AND TAPPING EQUIPMENT, HYDRAULIC DRILLING MACHINES . . . IN BUSINESS SINCE 1840

659 EVANS AVE. . . . CINCINNATI, OHIO



Specifications

Longitudinal Feed—20"
Cross Feed—9"
Vertical Feed of Knee—16"
Standard Table—9" x 32"
Special Tables up to 48" available; also longitudinal power feed
Weight with Shaping Unit—2000 lbs.

The difficult task of partial or complete conversion to the production of post-war items will find users of Bridgeport Turret Milling machines in a strategic position. The adaptability of these machines is such that job change will involve practically no machine change provided the work handled is within the capacity of the machine. Milling, drilling, boring and shaping without change in set up are offered in the "Bridgeport"—a basic feature of this modern machine. *Full details on request.*

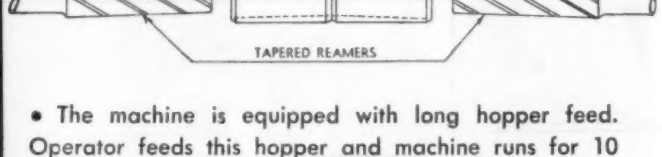
The Bridgeport MACHINES, Inc.
BRIDGEPORT, CONN.

SIX PISTON PINS

taper reamed at both ends IN ONE MINUTE WITH ····

HOEFER HYDRAULIC UNIT

This double end machine contains two 3-h.p. Hoefer Hydraulic Units and a Hydraulic Fixture—used for taper reaming both ends of piston pins. Machine is entirely automatic.



• The machine is equipped with long hopper feed. Operator feeds this hopper and machine runs for 10 minutes without any further attention. Then another feed is necessary.

The piston pins reamed in this particular job were 1 1/16" O. D. by 3⅝" long. Provision was made so that reamers could not collide.

• HOEFER UNITS suitably mounted and equipped with HOEFER Multiple Spindle Heads eliminate expensive and hard to get drilling equipment. They meet every production drilling requirement at a fraction of the cost of special drilling equipment.

Consider the many advantages of this equipment for post-war production. It will never be obsolete—you will have maximum flexibility—it will operate horizontally, vertically, or at any angle—adaptable to a wide range of work.

We are ready to discuss your drilling with you now.

Hoefer's Whole Business is Holes ····

HOEFER MFG. CO. *Freeport, Ill.*

NESTED MATERIAL IS SECURELY HELD UNDER HEAVY CUTS ON THE

PORTER-McLEOD COLD METAL SAWING MACHINE

Ability to cut stock from 3 inches up, to nest and hold bars or shapes securely for multiple cutting, combined with a standard feed of 3" per minute enable this modern, sturdy, clean-lined machine to make big savings in cutting-off time. A wide range of work can be handled by the 8" Porter-McLeod because of its capacity for 8" round or 7½" square stock. All cuts are accurately and cleanly made at highest speeds.

Truly high production is assured by unique features of design coupled with ample power. The blade is pulled upward through the stock, the blade being supported in such a way as to prevent buckling or weaving. Protection of the blade against hard spots in the stock being cut is provided by a friction disc feed. The Porter-McLeod blades are designed so that every tooth cuts, a feature which contributes to the remarkably fast cutting assured by this machine.

If you are interested in reducing time on cutting-off operations, get all details at once. Anyway, write for Descriptive Bulletin.

PORTER-McLEOD MACHINE TOOL CO., INC.

HATFIELD, MASS., U. S. A.

The WINNING TEAM

. . . ANNA BUSON *and her* BODINE

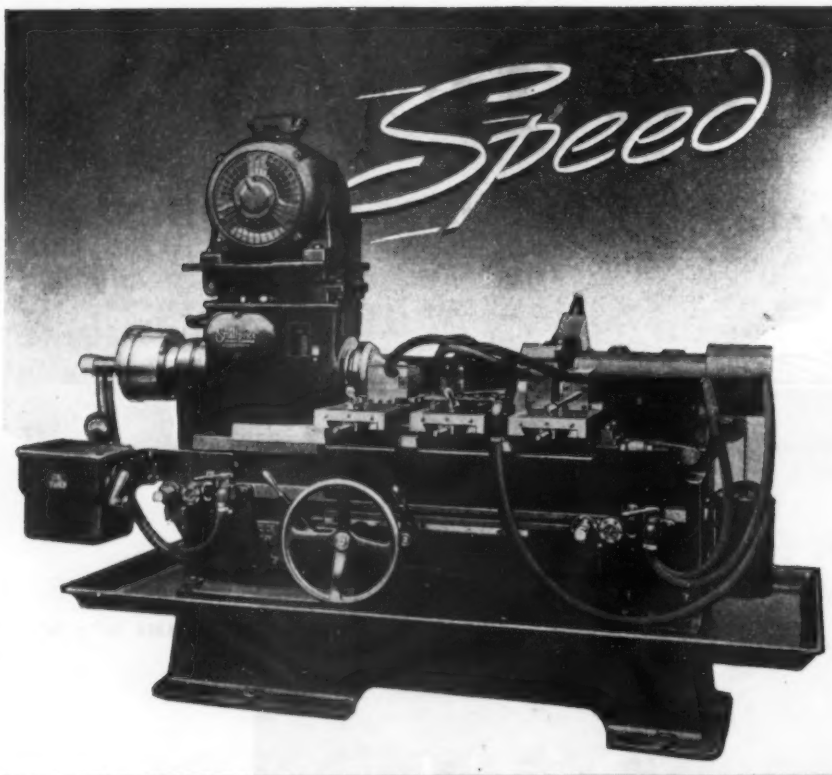
BODINE NO. 48-30
FLOOR AREA, 90" x 96"

Petite, 21 year old, blonde Anna Buson now wears the crown awarded by a Committee composed of agencies, plant supervisors, labor and government delegates, as the "Most Typical War Worker" in the country. She is here pictured operating a Bodine automatic in the Casco Products Corp., Bridgeport, Conn.

Miss Buson is processing a 4.2 Mortar Fuse for the Chemical Warfare Services . . . performing 7 operations during one cycle of the horizontal indexing dial, consisting of drilling, counterboring and tapping . . . producing 10 pieces per minute (70 operations). This job formerly required several machines and TEN OPERATORS. Through this war period Bodine has stressed the fact that women are ideal operators of the 6 standard Bodine Multiple Spindle automatic Tapping, Drilling and Screw Inserting machines. Naturally we are pleased that Miss Buson's attendance record has been "excellent" (Bodine operation has a low fatigue factor) . . . that her production record is "equally high" (good operators can make records with high speed Bodines).

Congratulations to Miss Buson for her award . . . and invitations to plant executives to investigate the Bodine Principle of automatic high speed production for now . . . for later. ***Bulletin and recommendations on request.***

THE
Bodine
CORPORATION
BRIDGEPORT CONNECTICUT
AUTOMATIC DIAL TYPE DRILLING, MILLING,
TAPPING, AND SCREW INSERTING MACHINES



Speed SPELLS SUCCESS

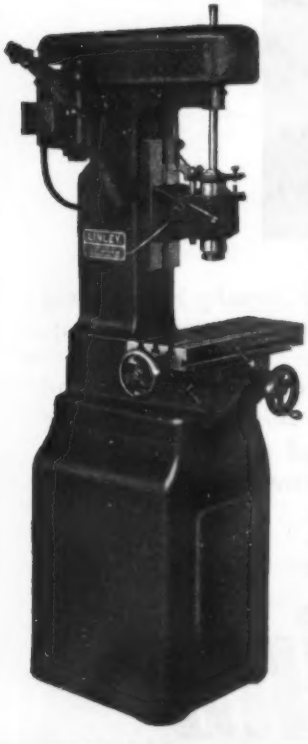
The Smallpeice Production Lathe spells equal success for either peace or war manufacturing. It is the ideal production machine for every type of regular turning, boring, facing and profiling—with a versatility that means a fine investment.

For complete information write Smallpeice, Ltd., 505 Rantoul Street, Beverly, Massachusetts.

SMALLPEICE

MACHINE TOOLS AND EQUIPMENT • MANUFACTURED IN U.S.A. AND GREAT BRITAIN

6 FEATURES YOU NEED IN A SMALL MILLER AND JIG BORER



The value of a little machine in a busy toolroom is measured by its adaptability to the continuous variety of small jobs . . . and the speed and accuracy of performing them. The Linley saves larger machines, earns profits two ways, because of these features:

1. 8 spindle speeds from 275 to 4250 r.p.m.
2. Quick set-up . . . easy change-over.
3. Direct micrometer setting, velvet feed.
4. Ample table size, 7"x17½".
5. Small floor space, 18½"x20".
6. Accurate, fast production.

Ask us for quotation and delivery date . . . get your order in for present rush work and for your future civilian production.

BULLETIN ON REQUEST

LINLEY BROTHERS COMPANY
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BRIDGEPORT 1, CONN.

DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1¼ in.

Write for illustrated bulletin.

DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.

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Avey
CINCINNATI OHIO

Do you have
DEEP HOLE
Drilling Problems?

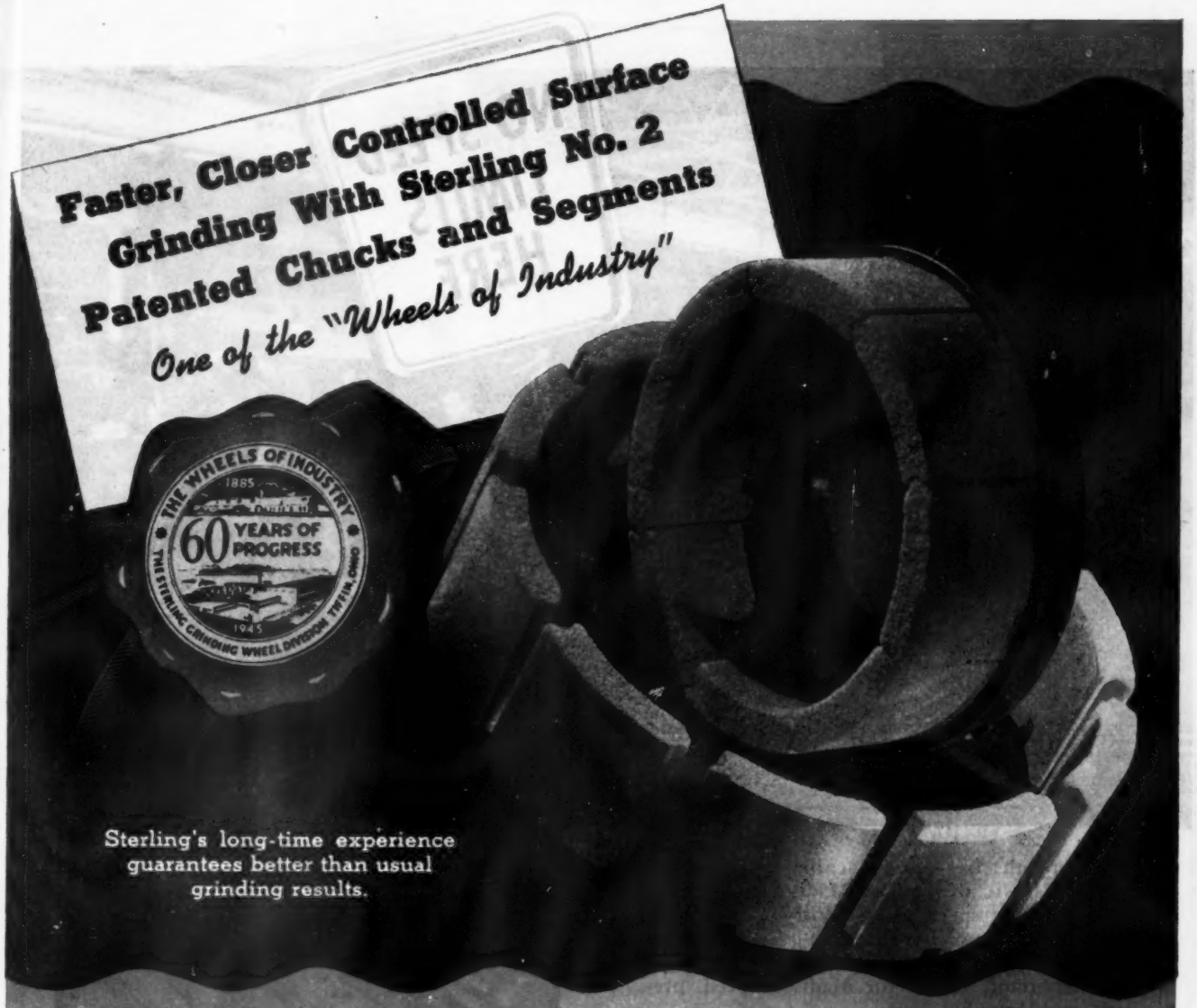
If so why not consult our
Service Engineering Department?

HYDRAULIC DEEP HOLE DRILLING MACHINES

LELAND GIFFORD
WORCESTER, MASSACHUSETTS

Faster, Closer Controlled Surface Grinding With Sterling No. 2 Patented Chucks and Segments

One of the "Wheels of Industry"



Sterling's long-time experience guarantees better than usual grinding results.

Sterling's segments are not gap-type. There is no large, open space between the segments to catch and send small pieces flying off the table. Their patented, interlocking design means added strength throughout the entire abrasive ring. The minute space between segments provides cooler grinding. Sterling segments remain firmly in place after being fastened in the chuck. One setting lasts until the segment wears down. It is a matter of moments to insert the socket wrench, remove the worn units and replace them with new ones.

Sterling No. 2 Chucks and Segments are adaptable to a variety of machines using 8" to 20" diameter cylindrical wheels . . . they provide close grinding control not ordinarily obtained. May we tell you how they can reduce costs and increase efficiency for you? Write today!

Sterling No. 2 Chucks and Segments are fully outlined in the new Specification Selector . . . so are other "Wheels of Industry."

Ask for your free copy on your letterhead and it will be mailed at once.

· STERLING ABRASIVES ·

THE
STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
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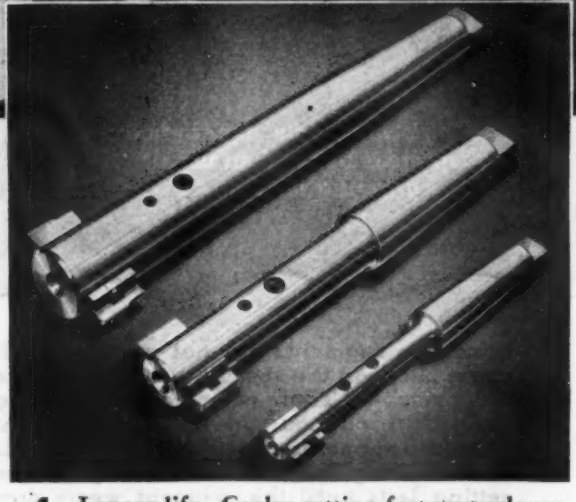
THE WHEELS OF INDUSTRY

The smooth, free-cutting action, quick adjustment and basic design of Madison Production Reaming Tools speed and simplify all types of reaming operations. Job efficiency goes up as costs come down. Rejects are held to a minimum. Check these important reasons for Madison speed, precision, and lower hole cost.

1 Greater chip clearance. The use of only two blades provides greater space for chip clearance. Clogging is thus prevented, heat and friction are greatly reduced. Closer tolerances are held, and a finer, smoother finish produced, which generally eliminates the necessity for any additional finishing operations.

2 Fast cutter change. A new or sharpened cutter can be inserted in any Madison bar without disturbance to the original set-up. Interchangeability of cutters and bars allows different sized cutters to be used with one set-up of a Madison Bar.

3 Less maintenance time. Less regrinding time is necessary with the two-bladed cutter. Only a few minutes are required to grind cutter and reset it to its original or any given diameter. Hole diameter is more quickly obtained because of Madisons' simple two-blade design. No multiple or inserted blades to set or readjust and grind.



4 Longer life. Cooler cutting feature prolongs tool life. The cutter can be expanded to make up for wear and regrinding. After sharpening, resetting is only a matter of moments with the Madison one-screw adjustment which enables accurate, quick setting of the cutter to its original size.

5 Controlled Float. The Madison cutter is floated at the point where the cutting action takes place. No special floating tool holders and chucks are necessary. The Madison controlled float feature makes it possible to hold a strict hole diameter where the cutter is replacing another type of cutting tool. With Madisons, float can be indicated for greater uniformity on long-time production jobs.

MADISON ADJUSTABLE REAMING TOOLS

MADISON ADJUSTABLE REAMING TOOLS

MADISON MANUFACTURING COMPANY

DEPT. A-3 **MUSKEGON, MICHIGAN**

"Seek and Ye Shall Find"

I'm agin it!

A high grade Tool Room or Engine Lathe must be designed to do all tool room work within its capacity, and also produce the finest gage work quickly and accurately—*but then what?*

Here at Hendey, we have always felt that the *simplification of controls* was almost as important as the machine itself. That's why we did something about it years ago. That's why you can always spot a Hendey Tool Room Lathe operator. He's satisfied because his machine has a *minimum* number of operating levers—every one within easy reach; every one actuated by a "natural motion." It all adds up to an easier, more productive, more profitable day's work for him and you too.

Hendey has taken care of maintenance points in the same way. Wherever possible, oil reservoirs are used. The carriage apron is entirely enclosed, even to the rack pinion. Access doors are provided where necessary, but don't swing so wide as to take three times the floor space required by the lathe itself.

Yes, "We're agin" Biblical "Seek-and-Ye-Shall-Find" methods. You will be too—after trying a Hendey on your tool room and engine lathe jobs.

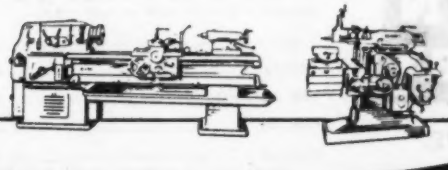
The Hendey Machine Company

Hendey

Main Office and Plant — Torrington, Connecticut

Branch Offices — New York, Chicago, Boston, Detroit, and Rochester

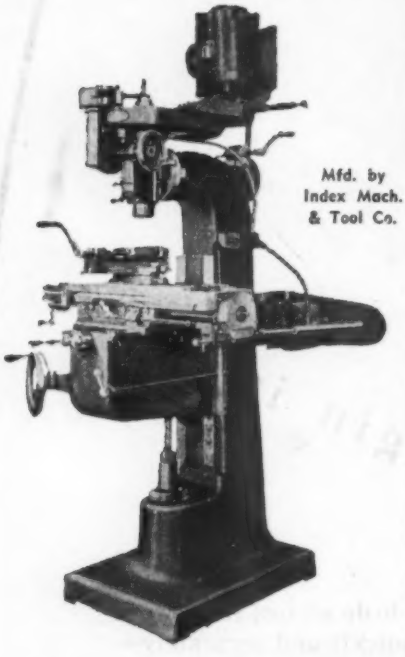
Representatives in — Phila., Cleveland, Los Angeles, Pittsburgh, San Francisco



TOOL ROOM LATHES SHAPERS

INDEX MILLS

will help you on your tool, die and production work. In addition to micrometer dials on screws, verniers are standard equipment for cross and longitudinal locating. If finer precision is desired, rods and indicators are available. These in conjunction with power feed to a precision ball bearing spindle make a very versatile machine for milling, drilling and boring. *Literature promptly mailed on request.*



Mfd. by Index Mach. & Tool Co.

12" Tool Room Rotary Table

A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 12" size only.

For use on Index Mills or any other machine that will accommodate a 12" table.

BLANK and BUXTON MACHINERY

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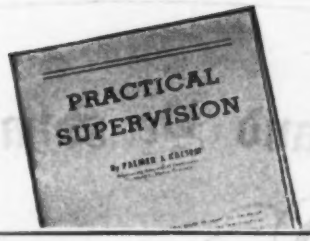

Use *these* methods to handle personnel, jobs and problems the *successful* way

Straight from the daily situations confronting line supervisors in a large aircraft corporation, this practical manual, simple and pleasant to read, instructs the supervisor on all the fine points of his daily contacts. It gives sound advice which will carry you over the rough spots of supervisory work and provides you with principles of conduct for handling all your jobs and problems. Sprightly cartoons and the human interest angle of every case make the treatment of every situation arising in the shop and office real and easy to grasp.

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By PALMER J. KALSEM

Engineering Educational Dept.,
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186 pages, 5¾ x 8¼, $2.00

This book demonstrates successful systems of raising morale, upping work quality, handling gripes and worries, giving orders, starting new workers right, planning a job, saving time, supervising women, getting your ideas across, conducting conferences and so on. It leads the supervisor into all the tight spots he can be in and then guides him out again, with the careful methods and sound judgment which mark the man who thoroughly understands his men and the jobs they are doing.

Check over these specific aids to the supervisor:

Improving morale; Raising quality of work done; Handling complaints by workers; Giving orders that get results; Starting new workers right; Supervising women; Rating your group; Developing self-confidence; Correcting errors; Criticizing constructively; Developing leadership qualities; Planning a job; Saving time; Selling ideas and methods; Conducting conferences; Getting along with the boss; Training employees.

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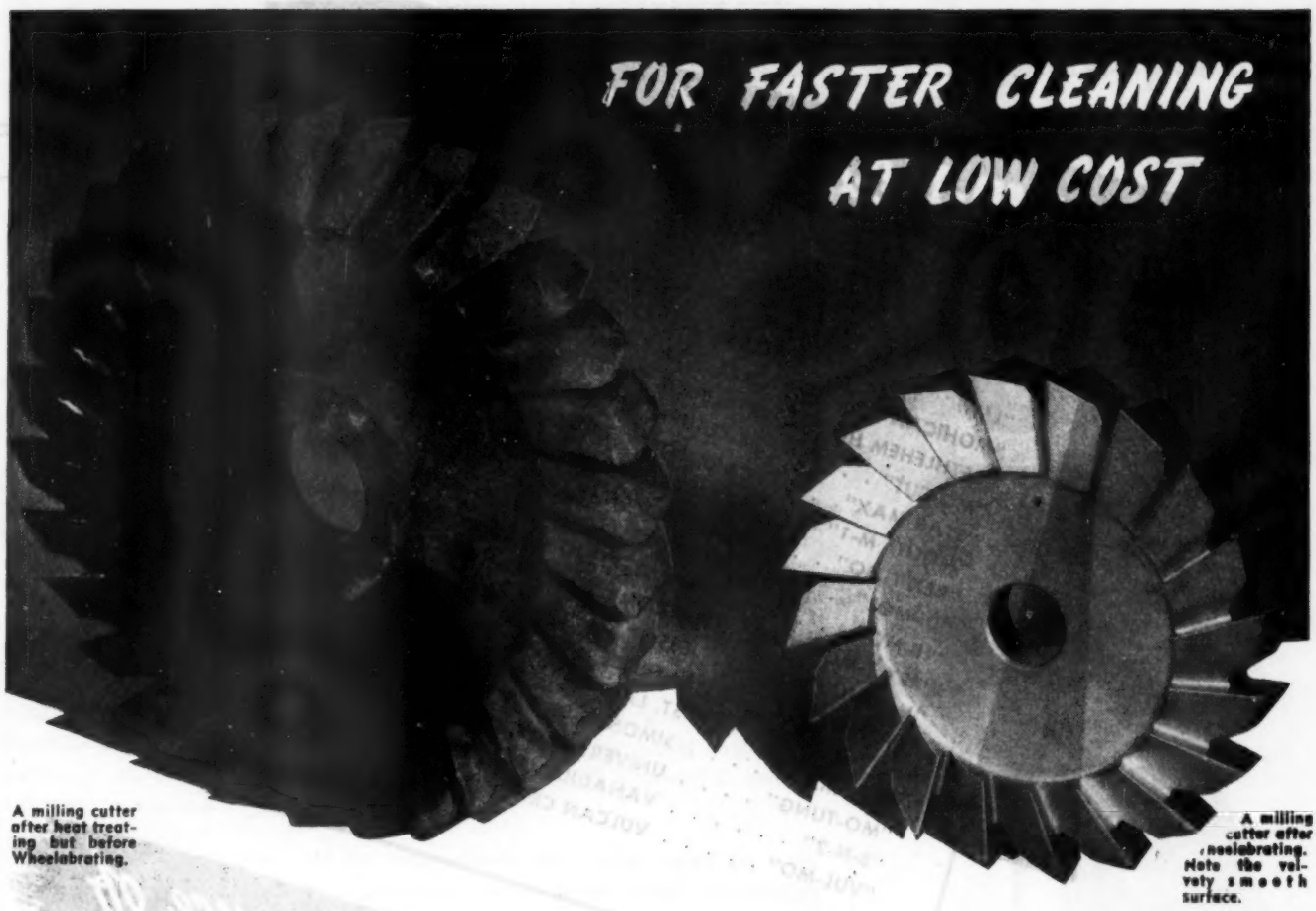


A milling cutter after heat treating but before Wheelabrating.

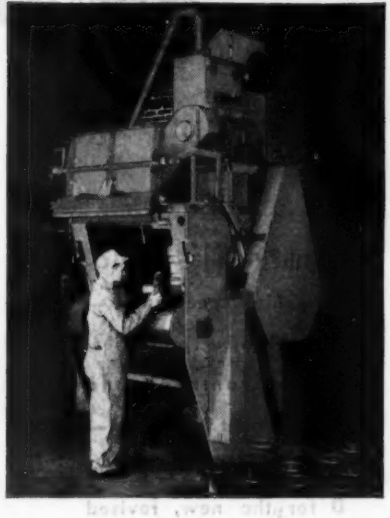
A milling cutter after Wheelabrating. Note the velvety smooth surface.

Wheelabrate HEAT-TREATED PARTS

The Perfection Tool and Metal Heat-treating Company of Chicago, using three airless Wheelabrator Tumblasts, reports that these machines speedily and efficiently remove scale deposited on tools and parts, both after heat-treating, and in preparation for it. They have found that Wheelabrating produces a velvety appearance that eliminates a great deal of expensive grinding.

The Wheelabrator Tumblast cleans batches of parts quickly, using minimum power and without damaging pieces of thin section. It employs the exclusive American endless apron conveyor principle of tumbling which provides *complete* exposure of all work to the action of the blast stream. Unloading is accomplished by simply reversing the conveyor. No other tumbling method can match the effectiveness of this design.

The performance of the Wheelabrator Tumblast as a time-saver and cost-cutter has long been recognized in hundreds upon hundreds of plants. In planning for business now or in the post-war period, investigate airless Wheelabrator equipment. Write now for full details.



Operator inspecting a Wheelabrated gear in a 27" x 36" Wheelabrator Tumblast.

American FOUNDRY EQUIPMENT CO.

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WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

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For the full story on MO-MAX high speed steels—their physical properties, their advantages, and how to heat treat them—write today to Department D for the new, revised MO-MAX Handbook.

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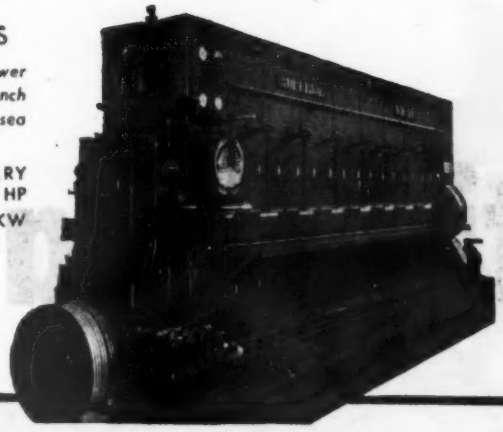

"Sunnen Precision Hone is the Only Equipment We Have Found That Will Give Us the Absolute Precision Required"

That is the experience of The National Supply Company, manufacturers of Superior diesel, oil, and gas engines, on needle guides for diesel engine fuel pumps. A micro No. 1 finish is required in 1045 steel, 45 Rockwell C; and no tolerance is allowed.

This is another example of the many tough jobs being licked by using Sunnen honing. While accuracy is guaranteed to be within .0001", it has often been held to .000025" in hard steel. Such accuracy plus super-smooth finish assures absolute interchangeability. It keeps costs down and saves material by reducing the number of rejects.

The Sunnen Precision Honing Machine . . .

- **Hones and finishes internal cylindrical surfaces from .185" to 2.625"**
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- **Produces a super-smooth finish of 2 to 3 micro-inches**
- **Can be used in any metal or plastic except lead and babbitt**
- **No jigs or fixtures needed**
- **Does not require skilled labor**
- **Can be "set up" for any size in one minute**
- **Economical to operate**

If you have an internal finishing problem, find out how the Sunnen Precision Honing Machine might be applied to your job. Call in a Sunnen engineer. He will be glad to give you complete information and recommendations—or write for complete information.

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Typical Jobs

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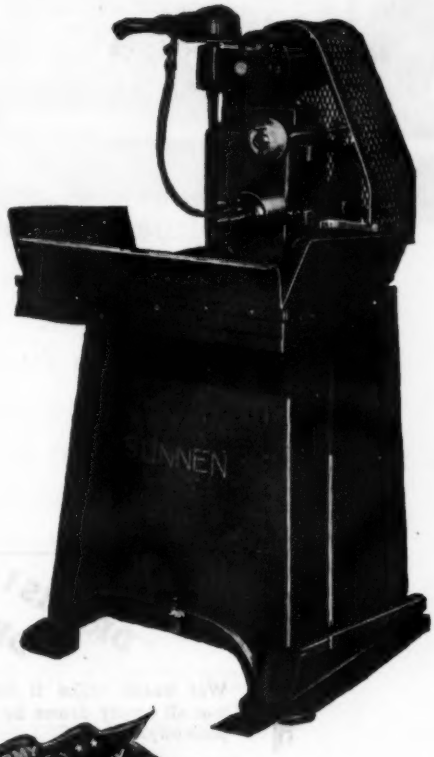
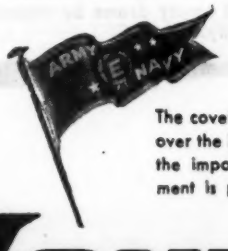
Carbureter Idler Valve Jet. Hole is honed after reaming for smooth action.

Bearing. A very small part. 2 micro-inch finish necessary.

Roller Bearing Outer Race. Finish improved from 12 micro-inches to 2 micro-inches.

Aircraft Carbureter Operating Valve Sleeve. Sunnen honing eliminates distortion from assembling operation.





The coveted Army-Navy "E" waves over the Sunnen plant—evidence of the important part Sunnen equipment is playing in the war effort.

SUNNEN HONING

Speed • Accuracy • Finish

Production Leaped...

WHAT MAKES TYCOL # 675 A GREAT CUTTING OIL

9 POINTS to REMEMBER

1. It Increases Tool Life
2. Steps-Up Production
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4. Reduces Fumes
5. Lowers Fire Hazard
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7. Leaves No Oil Sludge Deposits in Sump
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War needs make it imperative that all empty drums be returned promptly.

TYCOL INDUSTRIAL

ENGINEERED FOR EVERY

FROM 340 TO 640 SURFACE FEET PER MINUTE

with TYCOL SOLUBLE HD CUTTING OIL

That's a fact! In machining SAE 3140 Forged Sprocket Blanks 14" OD x 2¼" thick, an operator was cutting 340 surface feet per minute, with a feed of .011".

Then he switched to Tycol #675 Heavy Duty Cutting Oil — and was thereby able to increase speed to 640 surface feet per minute. In addition, due to Tycol #675's inherent characteristics, surface cleaning without the use of a degreasing agent was permitted . . . and rust eliminated.

You, too, will find that for heavy-duty cutting or grinding, Tycol #675's demonstrated superiority will help you increase production — lengthen tool life — and machine finer finishes in steel types from the SAE 1000 series through NE 9000 series.

Call or write your nearest Tide Water Associated office for full Tycol #675 details . . . or one of the many other performance-proved Tycol cutting oils — specifically engineered for every type of service.

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These convenient packages, containing the 12 or 20 wheels and points most commonly used, put the right tool within easy reach . . . no fumbling . . . no delay . . . no lost tools.

Bay State Mounted Wheels and Points . . . the ones in which *abrasive and mandrel are wedded for life* . . . also give you these other advantages:

1. *They need no breaking-in period*—because they are shaped on their own mandrels by precision lathes.
2. *They run absolutely true* — because the shaping process makes them concentric with their mandrels.
3. *They are free from hard and soft spots*—because they are made from blanks pressed to uniform hardness all the way through.

WRITE FOR LITERATURE. For Mounted Wheels and Points that will suit you the first time and ever after, specify Bay State. For extra convenience, order them in Utility Sets. Write for literature describing make-up, advantages and prices of Bay State's two Utility Sets.

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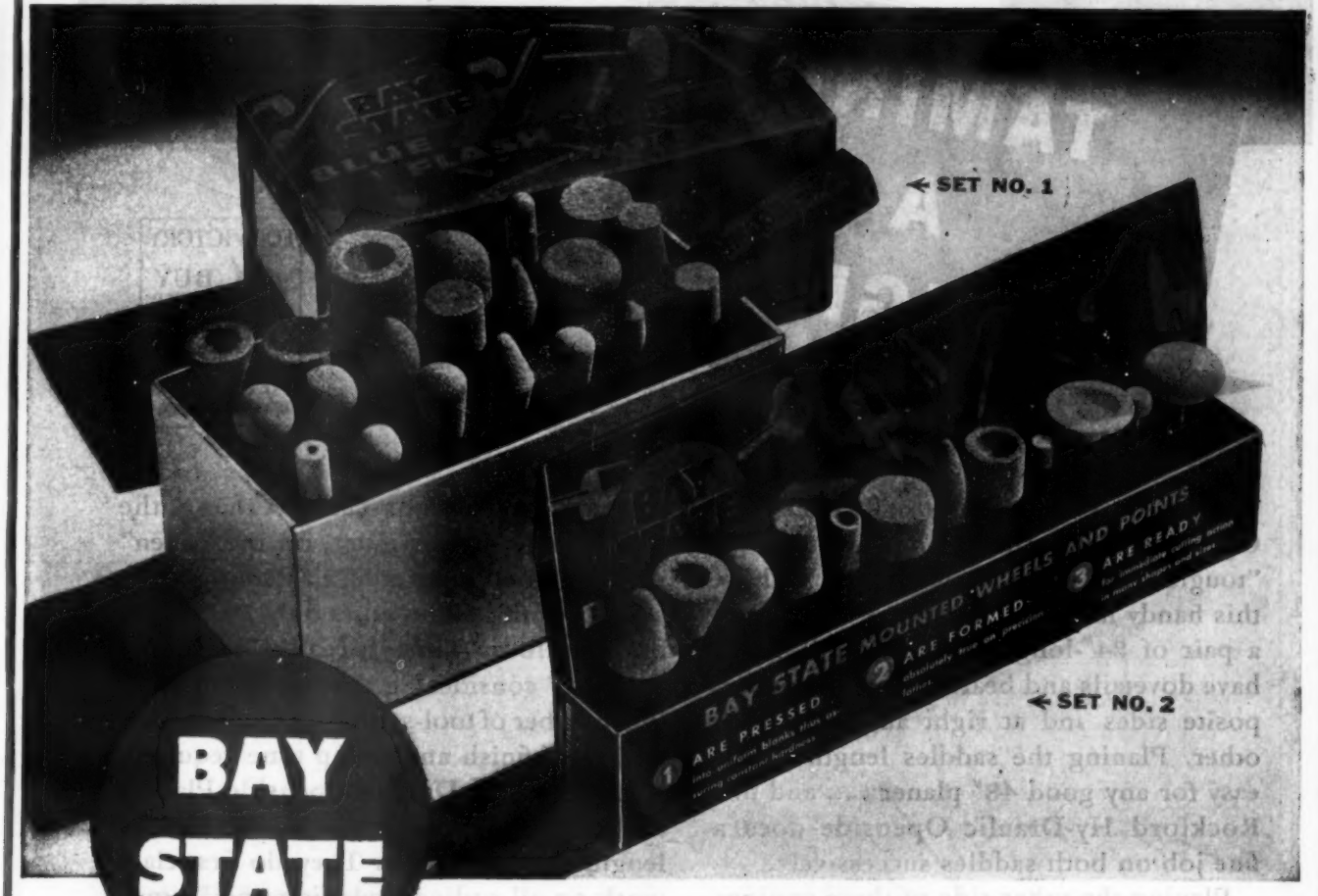

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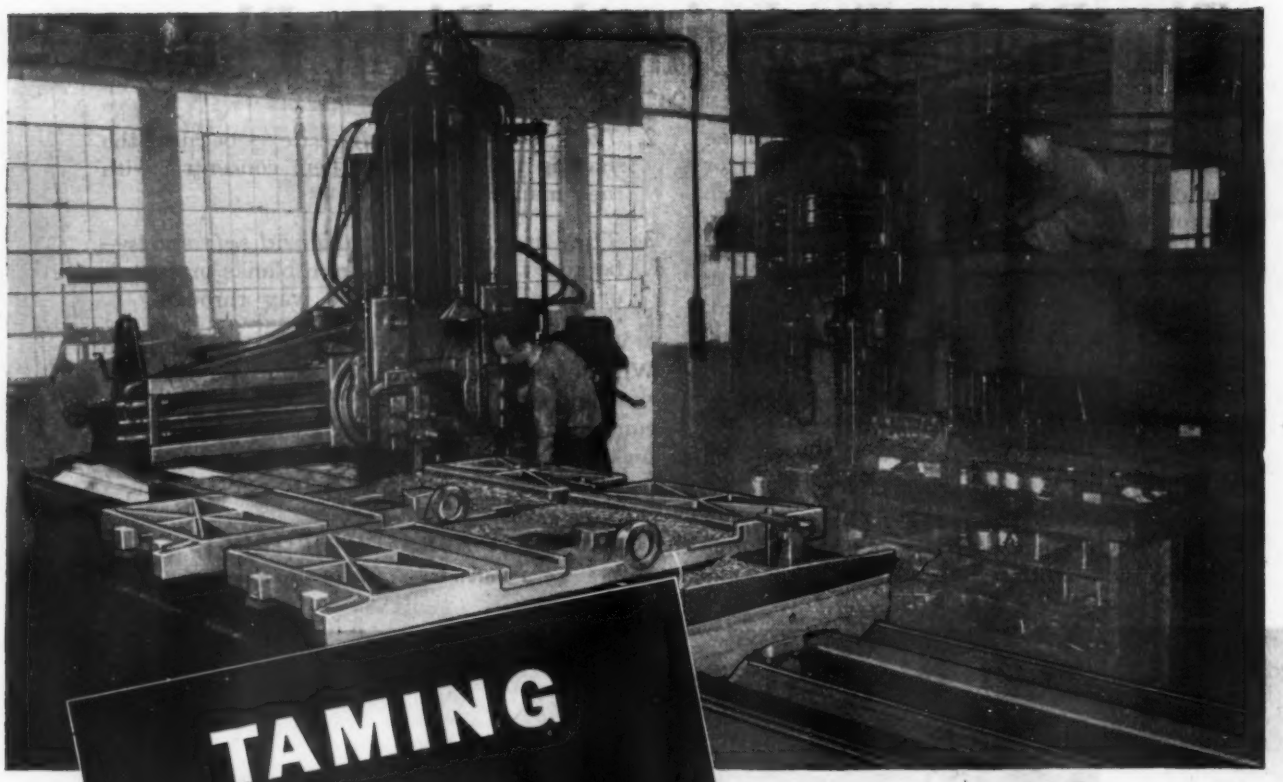
GRINDING WHEELS · HONING AND SUPERFINISHING STONES · PORTABLE SNAGGING WHEELS
MOUNTED WHEELS AND POINTS · CUT-OFF WHEELS · INSERTED-NUT DISCS AND CYLINDERS



TAMING A "TOUGHIE"

The job on the 48″ Rockford Hy-Draulic Openside Planer shown above would be a "toughie" to plane economically without this handy machine. The work consists of a pair of 84″-long cast iron saddles that have dovetails and bearing surfaces on opposite sides and at right angles to each other. Planing the saddles lengthwise is easy for any good 48″ planer . . . and this Rockford Hy-Draulic Openside does a fine job on both saddles successively.

Planing the other side of these castings would require a larger and much more costly double-housing planer. On the 48″ Hy-Draulic Openside the job remains easy because the castings can overhang the planer table 40″ or more, on the "open" side, without interference. Planing both sides of both saddles takes only 29.7 hours floor-to-floor. This is really "taming a toughie," considering the amount of planing, number of tool-settings, accuracy, high quality of finish and set-up time required.

Rockford Hy-Draulic Openside Planers are made in four capacities and in various lengths up to 20 feet. They do first-class work on all ordinary planing and "tame" lots of "toughies" besides. Investigate these Rockford Hy-Draulic machines today. Write for Bulletin 1126.

ROCKFORD MACHINE TOOL CO., ROCKFORD, ILLINOIS

The U. S. Multi Miller

. . FOR HIGH SPEED PIERCING — BLANKING — FORMING OPERATIONS

The photograph to the right, magnified 1.125 times, illustrates a formed metal stamping which is completed in one operation in the No. 28 U. S. Multi-Slide Machine from coil stock at the rate of 125 pieces per minute. The machine is arranged with two die heads. From the strip layout below, it will be observed that the die head operations are as follows:

1st Die Head — Pierce and trim.

2nd Die Head — Cup, preform and cut-off blank from strip.

The blank is then transferred to the forming position as shown. The die heads and forming tools are all actuated by means of split type cams. In the forming position it should be noticed that the right-hand forming slide is operated by means of a two-lobe cam. In forming, the front tool enters first, followed by the rear and then the right tool. At this point the rear and right tools are withdrawn while the front tool remains in position. The second lobe on the cam, operating the right-hand slide, again advances the right tool with the front tool still in position and the rear tool withdrawn. This completes the forming and the piece is dropped from the machine.

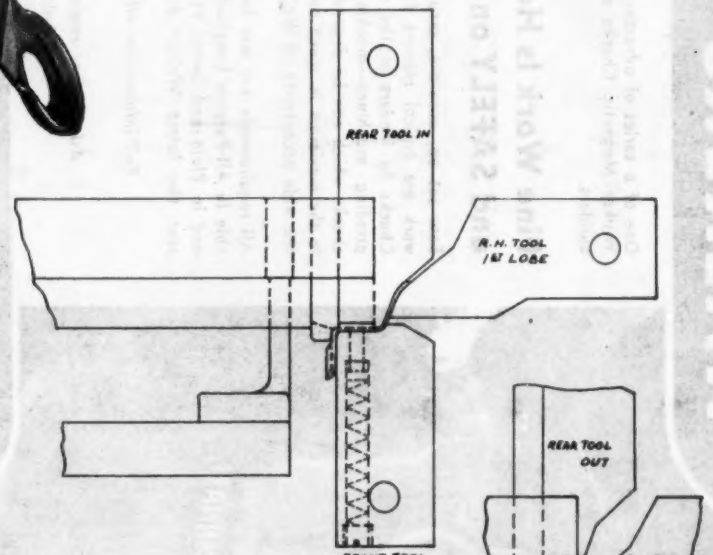
The photograph at the left shows the No. 28 U. S. Multi-Slide Machine, the size used for handling this operation.

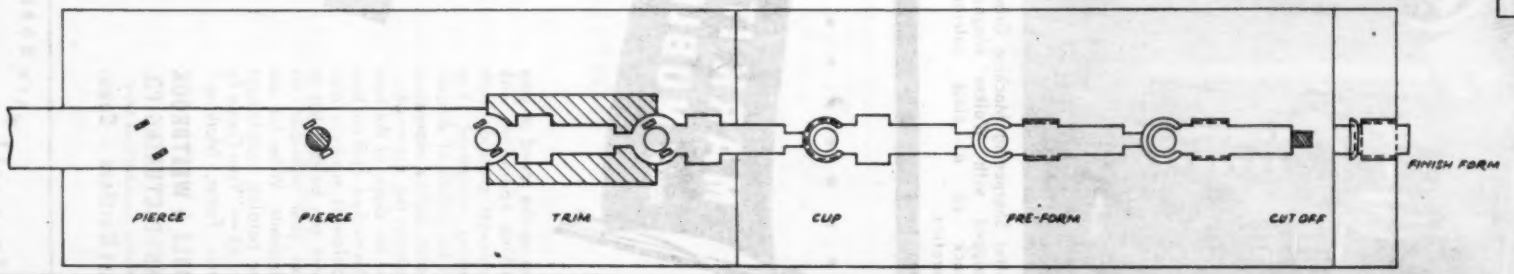
The U. S. Multi-Slide Machines are designed primarily for the automatic production of formed metal stampings from coil stock. Bulletin No. 15A contains complete specifications. Ask for your copy.

U. S. TOOL COMPANY, Inc.
AMPERE (EAST ORANGE), N. J.

BUILDERS OF U. S. MULTI MILLERS—U. S. MULTI SLIDES—U. S. AUTOMATIC PRESS ROOM EQUIPMENT—U. S. DIE SETS AND ACCESSORIES

Close-up of the formed metal part completed in one operation. Magnified 1.62 times.





"WALKERS" at work

Cutter Sharpening Machine Grinder equipped with Walker Magnetic Chuck on a close tolerance operation.

One of a series of advertisements showing specific applications of Walker Magnetic Chucks on machines of leading machine tool builders.

Fine Work Is Held Securely and SAFELY on WALKER CHUCKS

Easy set up, accurate, secure holding without danger of marring work are typical reasons for the selection of Walker Magnetic Chucks by leaders in the metal working industry. High quality grinding machines—machines designed for fine work—deserve chucks which can be depended on to help these machines perform to the maximum in speed and precision. This fact is recognized in the wide acceptance of Walker Magnetic Chucks.

All requirements are met in Walker Chucks which are now available in All-Purpose Longitudinal & Bar Pole Electromagnetic types and in Plain and Swivel Permanent Magnetic types which represent the latest Walker developments in this specialized field.

Full information will be sent promptly on request.

Ask Walker engineers to help you solve your holding problems.

O. S. WALKER CO.
WORCESTER, MASS.

MARK IT BEST with NOBLEWEST

Step up the speed of your marking operations with Noblewest precision built marking equipment. You will be certain of sharper, clearer, lasting impressions whatever the size — whatever the shape of the item to be marked. Find out how Noblewest marking machines can be adapted to meet your individual requirements. Write for our new catalog supplement No. 43 — "Your Guide To Better, Faster, Marking."

NOBLE & WESTBROOK MANUFACTURING CO.
Marking Specialists Since 1904
East Hartford - Conn.

MARK IT BEST WITH NOBLEWEST® — NOBLEWEST IMPROVED MARKING DEVICES

Is this YOUR Cleaning Problem?

REMOVING INSOLUBLE SMUT FROM STEEL PARTS SAFELY

Today's best answer to the problem of removing tenacious, insoluble smut from steel before electroplating is ANODIC degreasing with Oakite Composition No. 90.

This carefully engineered material is fast-working, thorough. Possessing exceptional conductivity, wetting-out, penetrating and emulsifying properties, it speedily removes all smut and soil. The surfaces you get are CHEMICALLY clean. Write for free booklet giving details.

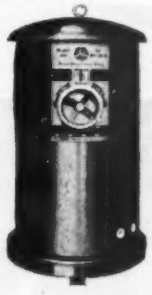
OAKITE PRODUCTS, INC., 24 Thames St., NEW YORK 6, N.Y.
Technical Service Representatives Conveniently Located in All Principal Cities of the United States and Canada

OAKITE CLEANING

This Girl Is Wrapping Up a *New* Production Tool

In 1917, A. O. Smith developed a method of coating electrodes with paper, which shielded the welding arc and produced welds of materially improved ductility and tensile strength—a revolutionary advance in the relatively primitive art of welding.

Now in 1945, continuous welding research in A. O. Smith laboratories and plants makes possible the fabrication of 28,000-pound stern frames for cargo ships by the electric arc welding method —a process involving standard SMITHway electrodes and a mastery of modern welding preparation and techniques.



Soon . . . a Complete Line of SMITHway A. C. WELDERS

Ready for delivery soon, the expanded line of A. C. Welders includes three new models of 150- 200- and 250-ampere capacity, in addition to the HEAVY DUTY MODELS of 300- 400- and 500-ampere capacity. Write for complete specifications and prices.

The Proof Is in Production

Welding research never ends at A. O. Smith. It goes on in the laboratories. It goes on in actual daily production. Every day more than 320,000 SMITHway electrodes are used in A. O. Smith plants on parts and products ranging from the smallest and simplest to the largest and most complex. Millions are used in the plants of other manufacturers. For detailed specifications on SMITHway Certified electrodes and their application to specific welding jobs, send for the SMITHway Welding Catalog.

Mild Steel . . . High Tensile . . . Stainless Steel
WELDING ELECTRODES

made by welders . . . for welders

A.O. SMITH Corporation

NEW YORK 17 • PITTSBURGH 19 • CHICAGO 4 • TULSA 3
HOUSTON 2 • DALLAS 1 • LOS ANGELES 14 • SEATTLE 1
INTERNATIONAL DIVISION: MILWAUKEE 1, WIS. • In Canada: JOHN INGLIS CO., LIMITED

Offices and Plant of The Adamant Tool Company, Bloomfield, New Jersey, upon the occasion of the Army-Navy "E" Award.

Offices and Plant Wheel Trueing Tool Company, Detroit, Michigan

Announcement

AS a further development of our policy of expanding and improving our services, facilities and resources, I am happy to announce that Wheel Trueing Tool Company has acquired the plant and equipment, name and goodwill of The Adamant Tool Company of Bloomfield, New Jersey.

The Adamant Tool Company has long been known to buyers of diamonds and diamond tools as one of the most progressive and competent organizations in this highly specialized field and it is therefore a pleasure for me to announce the union of the two companies.

Adamant recently acquired the consumer sales business of United States Industrial Diamond Corporation and will continue its service to the U.S.I.D. clientele as well as to the Adamant clientele.

All the well-known products of Wheel Trueing Tool Company will be available through the Adamant sales force which will thus supplement the Wheel Trueing sales force particularly in the Eastern Area.

This expansion of scope and resources makes Wheel Trueing Tool Company, more than ever before, one of the world's leading suppliers of diamonds and diamond tools.

Harry B. Wallace
PRESIDENT

WHEEL TRUEING TOOL COMPANY

3200 WEST DAVISON AVENUE • DETROIT, MICHIGAN

WHEEL TRUEING TOOL COMPANY
OF CANADA, LIMITED
575 Langlois Avenue
WINDSOR, ONTARIO, CANADA

THE ADAMANT TOOL COMPANY
Eastern Division of Wheel Trueing Tool Company
657 Bloomfield Avenue
BLOOMFIELD, N. J.

A time saver that speeds production

SCOTCH BRAND *Masking* **TAPE can be die cut to solve difficult masking jobs**

"SCOTCH" Masking Tapes with correct weight backings permit dieing out shapes to mask openings, as illustrated.

This is just one of the many jobs where "SCOTCH" Masking Tapes are an outstanding tool for solving production problems that have been "toughies."

"SCOTCH" Masking Tapes are made with a range of constructions such as varied backings — crepe, flatback, lightweight or heavy and correct adhesives. You can select the proper tape to meet your specific requirements.

The unmatched experience gained as originator and largest manufacturer of unified pressure sensitive tapes is at your service to help solve your tape problems. The coupon below will bring this help to you —without obligation.

3-M

MINNESOTA MINING AND MANUFACTURING CO.

GENERAL OFFICES: SAINT PAUL 6, MINN.
BRANCHES IN PRINCIPAL CITIES

"SCOTCH" is the trade-mark for the adhesive tapes made by M. M. and M. CO.

"SCOTCH" Tape is used for MASKING • HOLDING • SEALING SPLICING • REINFORCING • PROTECTING • SANDBLASTING

Kindly have a "SCOTCH" Tape engineer call. AM845

Company_____

Address_____

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By_____ Title_____

AMIC

Precision VERNIER GAGES

NOW RELEASED TO THE TRADE

AMIC PRECISION VERNIER CALIPERS

6" 10" 12" 24" Range
150mm, 250mm, 300mm, 600 mm available from stock or on short delivery.

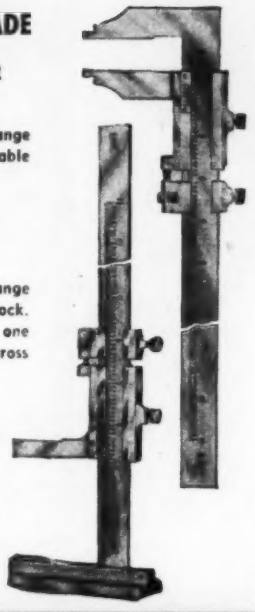
AMIC PRECISION VERNIER HEIGHT GAGES

10" 18" 24" Range
250mm, 460mm, 600mm available from stock. Long "Open-window-type" slider out of one solid piece of toolsteel. No rivets, no cross members.

Base and slider of Height Gages rust-proofed by attractive deep penet a-tion—Black Magic Finish.

All hardened parts treated by high frequency process.

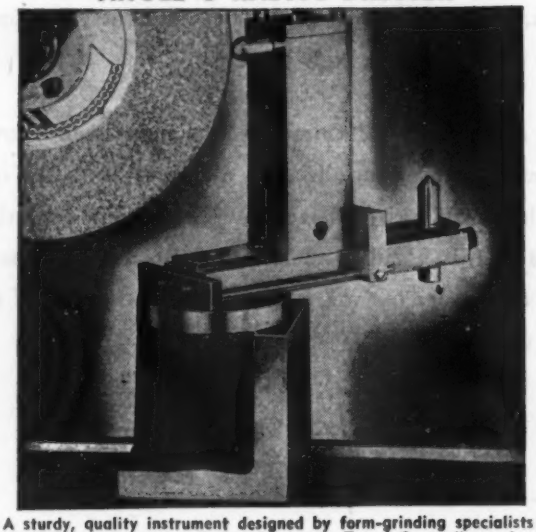
ASK FOR LITERATURE AND PRICES.



AMERICAN MEASURING INSTRUMENTS CORP.
240 WEST 40th ST. • NEW YORK 18, N. Y.

The "FORM MASTER"

ANGLE & RADIUS DRESSER



A sturdy, quality instrument designed by form-grinding specialists to dress BOTH angles and radius at low cost. Two 1/3 ct. diamonds and case included—$150.00 complete.

Features

Large range	.0001" accuracy obtainable
Chatterless	Simple to operate
Dustproof	Reasonably priced

Call your supplier or write

J. & S. TOOL CO. 477 Main Street E. ORANGE 1, N. J.

17 ADVANTAGES

FOR YOU IN REPUBLIC'S NEW

Shankless* Drill

ROLL-FORGED

THE COMPLETE STORY IN THE NEW MANUAL . . . MAIL THE COUPON FOR YOUR FREE COPY

• A better, tougher, longer-lasting drill at a lower price—what more could you say about a twist drill? Yet that is only a small part of the story of Republic's new "Shankless" drill. There are actually 17 money-saving and operating advantages of this new kind of drill. And they've been proved on the production lines of many of the largest, most progressive manufacturers. If you are a user of twist drills, Republic can show you a way to cut production costs. Send for this book, which tells a real economy and performance story.

*Registered at U.S. Patent Office

Republic Drill & Tool Co., A.M.-8
322 South Green Street
Chicago 7, Illinois

Please send me a copy of your new Manual which gives the complete story of Republic's "Shankless" drills.

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Republic DRILL & TOOL COMPANY

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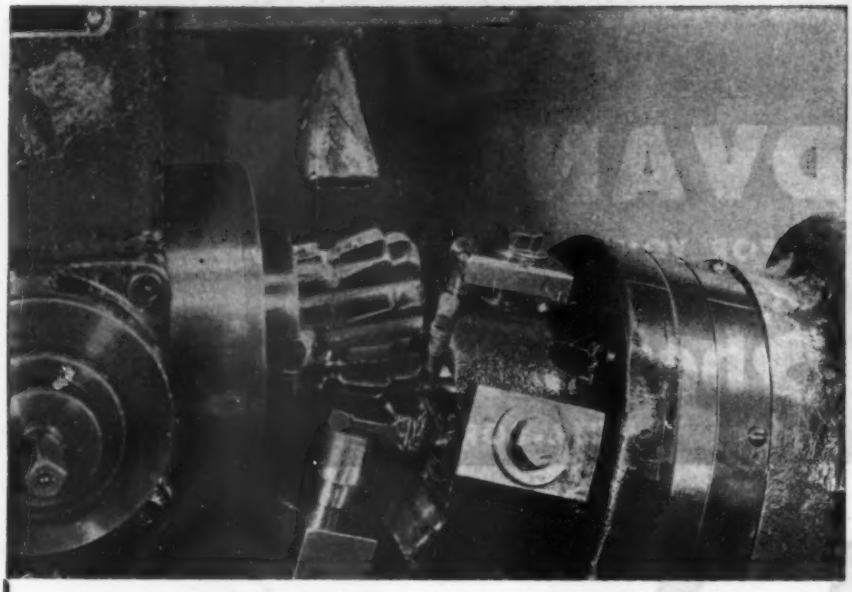
BOSTON • NEW YORK PHILADELPHIA • PITTSBURGH • CLEVELAND • DETROIT • DAYTON • BIRMINGHAM • LOS ANGELES • SAN FRANCISCO

WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF TWIST DRILLS



Manufacturing Turbochargers at the American Locomotive Company

From Blueprint to Product

Among the important operations of the American Locomotive Company is the manufacture of turbochargers which are playing a vital part in our war effort. The accompanying picture shows the high speed ground form relieved milling cutters manufactured by National Tool Company milling turbocharger blades which are made of KA-SNO or Type 316 Stainless Steel Forgings. The maximum Brinell hardness is 207.

This operation is performed on a No. 2 Electromil with a feed per minute of 1.9". The cutter is removing approximately .020" stock. The machine is operating at 105 R.P.M. and the cutter completes 150 pieces before requiring regrinding.

The development of the cutter for this job is the result of co-operation between the American Locomotive Company and the Engineering and Metallurgical Departments of National Tool Company. Similar problems involving other milling operations are welcomed for consideration by our Engineering Department.

NATIONAL TOOL PRODUCTS

BROACHES • HERRINGBONE CUTTERS
SLITTING SAWS • COUNTERBORES
REAMERS • GEAR SHAPER CUTTERS
GEAR CUTTERS • MILLING CUTTERS
CIRCULAR AND FLAT FORM TOOLS
HOBS, GROUND AND UNGROUND
SPECIAL TOOLS

National Tools are the shapers of Progress

NATIONAL TOOL Co.
11200 MADISON AVENUE CLEVELAND, OHIO

STANDARD US SINCE 1915
HEADS

All Types of Fixed Center

DRILLING TAPPING & BORING HEADS

Four Spindle Head. All Spindles Adjustable for equally spaced holes.

FIVE TYPES, 56 SIZES, ADJUSTABLE DRILL HEADS
UNITED STATES DRILL HEAD CO., CINCINNATI 4, OHIO

GRINDING WHEEL DRESSER

Desmond Cutter

Desmond Hex Dresser

We manufacture a complete line of Dressers and Cutters.
Write for copy of catalog "A".

DESMOND-STEPHAN MFG. CO.
URBANA, OHIO
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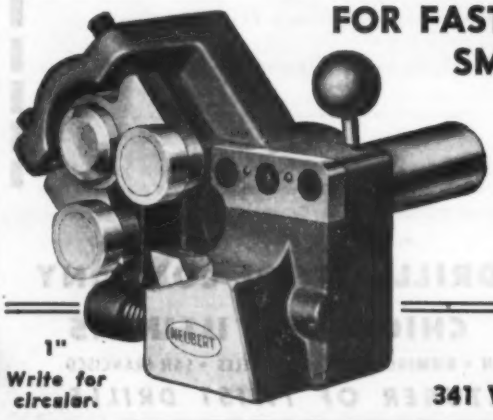


FOR FASTER STOCK REMOVAL, UNIFORM SIZE AND SMOOTH FINISH . . . . . you'll find NEUBERT BAR TURNERS fill the bill

They are easy to set up, hold to size, and operate with heavy cuts and feeds and roll the work to a smooth, burnished finish.

Speed your production with NEUBERT BAR TURNERS.

Three Sizes	*Quick delivery*
⅝" capacity	$ 68.00
1" capacity	85.00
1¼" capacity	110.00

1"

Write for circular.

NEUBERT MACHINE COMPANY
Precision Cutting Tools
341 W. WILLOW LONG BEACH 6, CALIF.

Get the right S/V Sova-Kote to meet your individual needs!

LOOK AROUND your plant! You may be surprised to find many spots where you can effect important savings by stopping rust during storage.

For instance, you may have a number of assembled machines temporarily idle due to shifts in production schedules. Auxiliary engines, accessories, tools, dies, jigs and fixtures may be set aside, awaiting further use. Or some of your finished metal parts may be in storage, awaiting assembly or shipment.

Where rust is a danger you can be certain of the answer in the complete S/V Sova-Kote line. For this line now includes 11 proved rust prevention products, designed to meet every current need of modern industry.

Call your Socony-Vacuum Representative. Tell him what machines and metal parts you want protected, where they are to be stored and how long. He'll recommend the product best suited to each need, and assist your men in proper application for maximum protection.

SOCONY-VACUUM OIL CO., INC.
Standard Oil of N. Y. Div. · White Star Div. · Lubrite Div. · Chicago Div. White Eagle Div. · Wadhams Div. Magnolia Petroleum Company · General Petroleum Corporation of California.

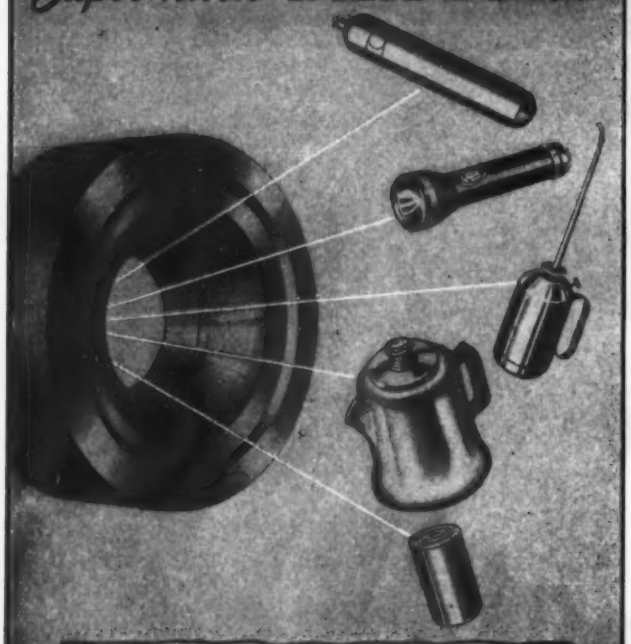
SOCONY-VACUUM'S 5 Steps to Lower Production Costs:

1. Lubrication Study of Your Entire Plant
2. Lubrication Schedules and Controls
3. Lubricant Storage and Handling System
4. Skilled Engineering Counsel
5. Progress Reports of Benefits Secured

GARGOYLE Lubricants

TUNE IN "INFORMATION PLEASE"—MONDAY EVENINGS, 9:30 E.W.T.—NBC

DEEP DRAWN THROUGH... *Super-hard* TALIDE DIES



TALIDE DIES, with super-hard tungsten carbide nibs, are performing an outstanding War job today in producing millions of cartridge cases, bombs, rocket tubes, ammunition and other critically needed ordnance items.

The production advantages of LONGER DIE LIFE, MORE CONTINUOUS PRESS OPERATIONS, CLOSER TOLERANCE, BETTER FINISH and FEWER REJECTS are increasing the output of press lines all over the nation.

Tomorrow . . . these advantages plus the extra hardness, density and toughness of Talide Dies will make it possible to mass produce at lower cost deep-drawn automotive parts, kitchen utensils, flashlight cases, cosmetic containers, food and beverage cans, high pressure gas tanks and a multitude of other peace-time products.

Talide Sheet-Metal Dies, made by our exclusive Hot Press Method, are available in hole sizes up to 24". Our experienced organization is at your disposal.

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METAL CARBIDES CORPORATION
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ERRINGTON MECHANICAL LABORATORY
STAPLETON, STATEN ISLAND 4, N. Y.
MULTIPLE HEADS

Super-Sensitive Fixed Center Multiple Drilling Heads
Fixed-Center Auto-Reverse Multiple Tapping Heads
All Parts Fully Enclosed to Insure Pressure Lubrication and Rigid Support of Adjustable Spindles
ADJUSTABLE MULTIPLE SPINDLE DRILLING HEAD

HARDNESS TESTER

Let the SCLEROSCOPE speed up the production of that s so we can blow the Axis to HELL

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TELEPHONE: JAMAICA 6-4090

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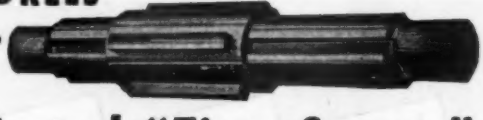
NICHOLSON E-X-P-A-N-D-I-N-G MANDRELS ARE

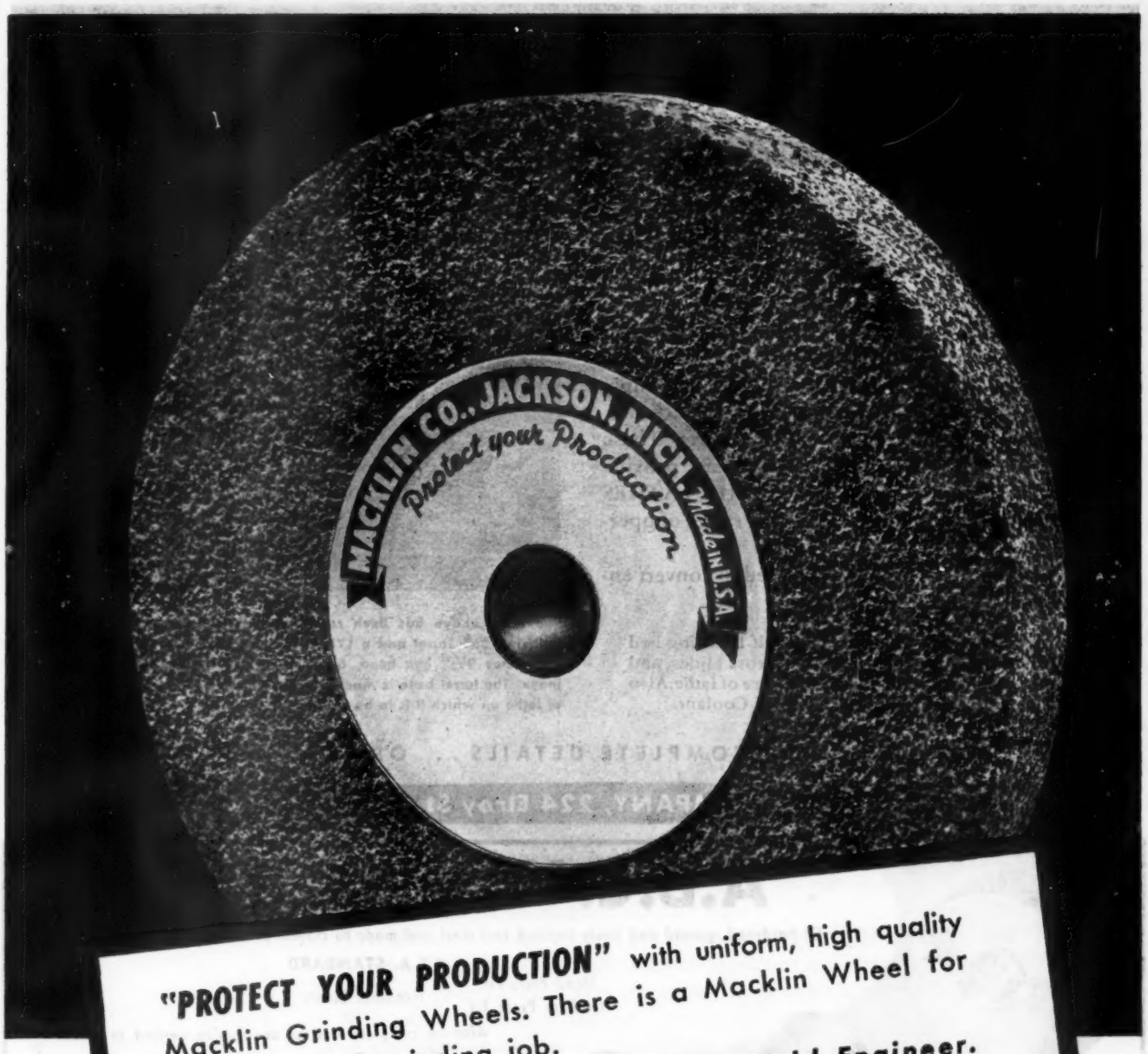


Time-Tested "Time Savers"

Set of 19 of these economy, precision tools does the work of 193 solid arbors. Hardened tool steel. Two types, all sizes. Sold singly or in sets. Prompt delivery. *Bulletin 1043.*

Other Products: Steam Traps, Control Valves, Arbor Presses, etc.

W. H. NICHOLSON & CO., 114 Oregon St., Wilkes-Barre, Pa.



"PROTECT YOUR PRODUCTION" with uniform, high quality Macklin Grinding Wheels. There is a Macklin Wheel for every type of grinding job.

Ask for the services of a Macklin Field Engineer.

MACKLIN GRINDING WHEELS

MACKLIN COMPANY — *Manufacturers of* GRINDING WHEELS — JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

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LYNN

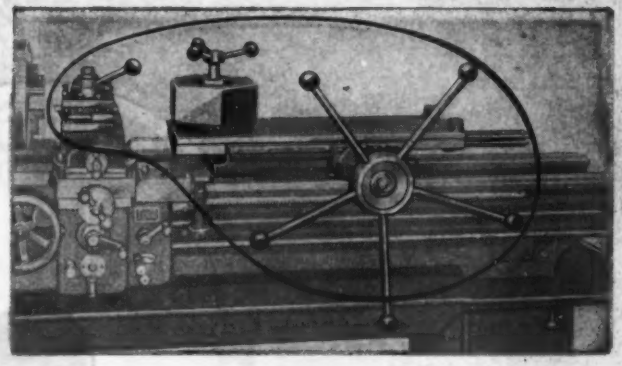
Reconditions Your TURRET LATHES and SCREW MACHINES *Overnight at Low Cost*

Puts Idle or Unproductive Lathes Back Into FULL-CAPACITY PRODUCTION AT ONCE

● No delays, no tedious overhauling—your turret lathes and screw machines can be completely reconditioned without going out of your plant—and full-scale production resumed immediately. Simply mount LYNN Bed Turret units on your machines, replacing worn or inaccurate turret parts. These finely machined and perfectly fitting units provide you with the equivalent of NEW TURRET LATHES in capacity, accuracy, speed and wide range of operations.

LYNN turret units can also be used to convert engine lathes to turret lathe work.

We manufacture a complete line of Self-Indexing Bed Turrets, Tool Post Turrets, Cut-off Cross Slides, and other equipment for every make and size of lathe. Also Steel Lathe Legs and Splash Pans for Coolant.



The lathe above has been reconditioned with a LYNN BT-3—Self-Indexing Bed Turret and a LYNN Precision Tool Post Turret. The Bed Turret has 9½" hex head, 6 positions, 10" turret travel, automatic index. The turret base is machined at factory to fit the particular make of lathe on which it is to be mounted.

WRITE OR WIRE FOR COMPLETE DETAILS . . . OR SEE YOUR JOBBER

LYNN MANUFACTURING COMPANY, 224 Elroy St., Minneapolis 8, Minnesota

A.B.C. DRILL JIG BUSHINGS

Prompt Shipment from Stock

Of hardened, ground and finely finished tool steel and made to closest precision in following types:

A.S.A. STANDARD

Head Press Fit
Headless Press Fit
Headless Liners

Also—a complete line of accessories carried in stock.

Write for Catalog No. 243

ACCURATE BUSHING CO., 40 North Ave., Garwood, New Jersey

ABC TRADE MARK

. . . for difficult operations on stringy metals—

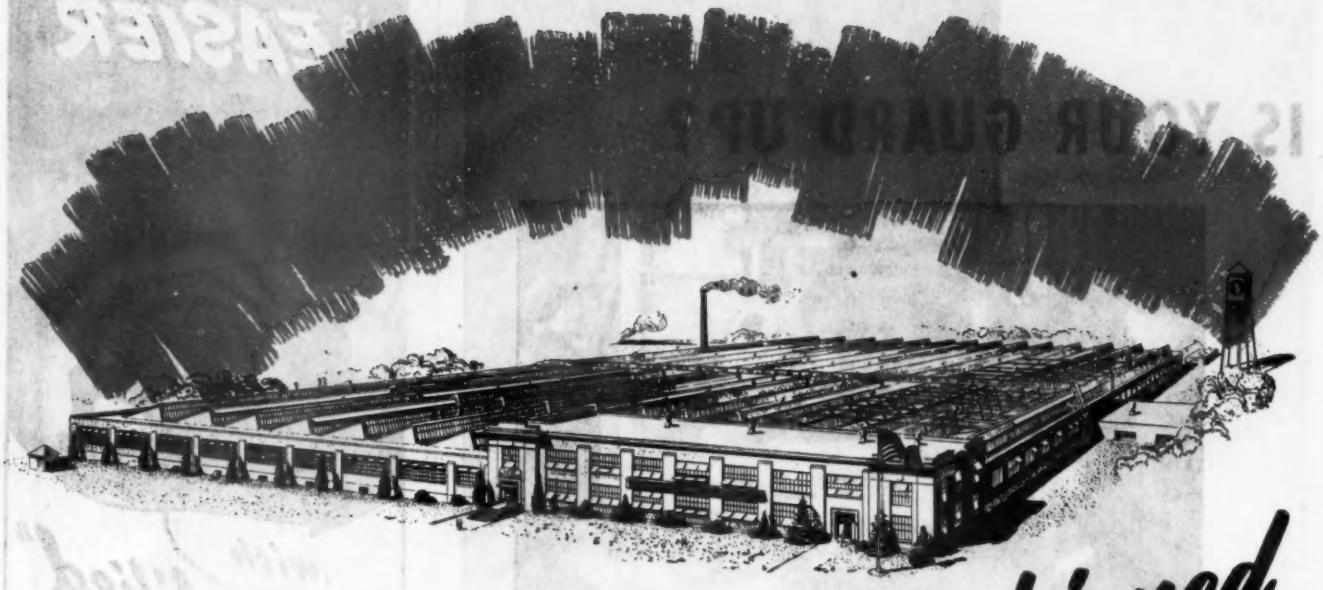
• Time after time . . . on millions of parts machined from tough, stringy metals . . . ThredKut has proved to be the only cutting oil capable of producing required finish and tool life. This famous oil product, plus the skill of Stuart Oil Engineers, can do the job for you too. D. A. Stuart Oil Co., Ltd., 2729 So. Troy Street, Chicago 23, Illinois.

Stuart's ThredKut HEAVY DUTY CUTTING OIL

D. A. Stuart Oil CO.

FOR ALL CUTTING FLUID PROBLEMS
Stocks in Principal Metal Working Centers

ESTABLISHED 1865



So, We'll BE Old-Fashioned

(IN OUR ADVERTISING)

Ad men tell us that plants haven't been shown in ads for 20 years. We're doing it anyway. Because the kind of plant we run has much to do with the kind of motors we make.

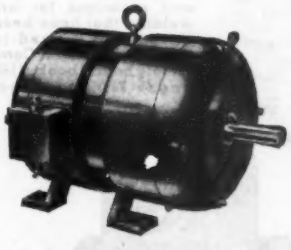
You see above what we call a BIG small plant, (290,000 sq. ft. and 1500 workers). Big enough to build a lot of motors of the kind Star builds. Small enough so we can keep a close eye on all the details that affect quality.

You see a plant that anybody would call modern. And, its equipment is as up-to-the-minute as the buildings, including fine research and testing facilities.

You Don't See the Important Part . . .

No picture can show you the kind of men who build Star Motors, or the way they work. But, come to visit us someday, and you'll see a plant full of real "motor men" . . . men who put the best of themselves, along with the best of materials into the motors they build. See us at our job and we won't need to sell you on making Star your *"Motor Department"*.

With a complete line of standard motors and design know-how that has licked "stumpers" in motor application for many important makers of power-driven products, Star is ready to work with you on any need. Early delivery of some standard motors can be made. For AC or DC motors ⅛ to 200 HP and AC or DC generators to 150 KW, write Star Electric Motor Company, 216 Bloomfield Avenue, Bloomfield, N. J.



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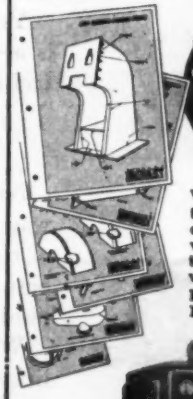

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Examples of the almost unlimited variety of indexing operations on which the Hartford Super-Spacer may be advantageously used indicate the possibilities of this modern spacing device as a means of speeding up work in production and toolroom.

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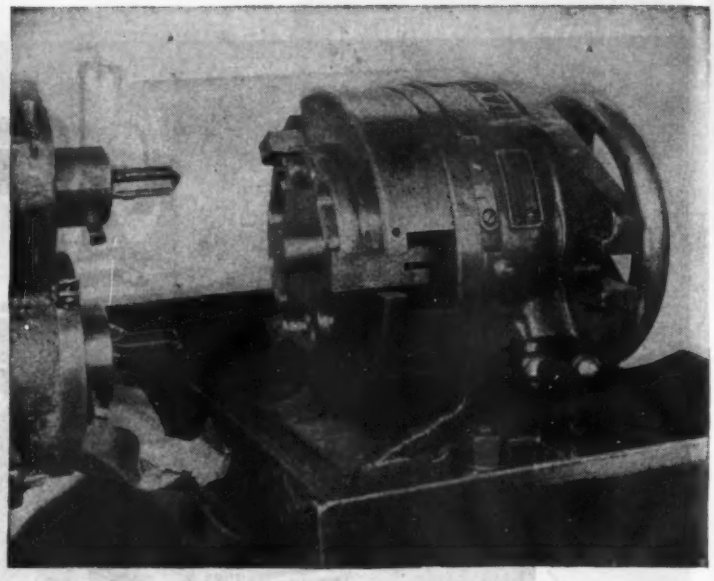

Several attachments are available for use with the Hartford Super-Spacer which greatly extend the utility of this device and which will in many cases avoid the necessity for investing in costly fixtures for handling out-of-the-ordinary work. If you are a Super-Spacer user, ask us to give you further information because these attachments can be easily applied to standard Super-Spacers. If you do not use Super-Spacers, now is the time to get full information and be prepared to meet the challenge which lies ahead in low cost production.

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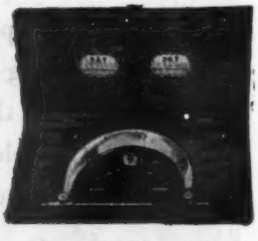

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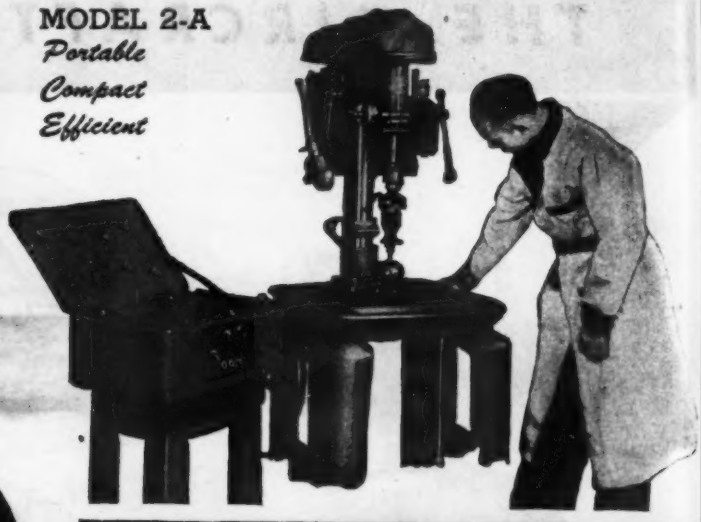

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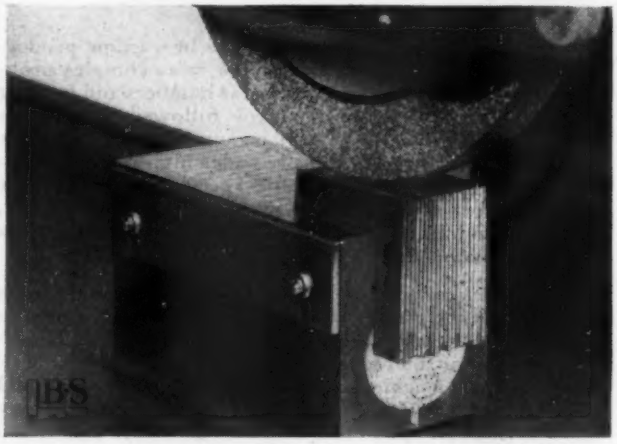

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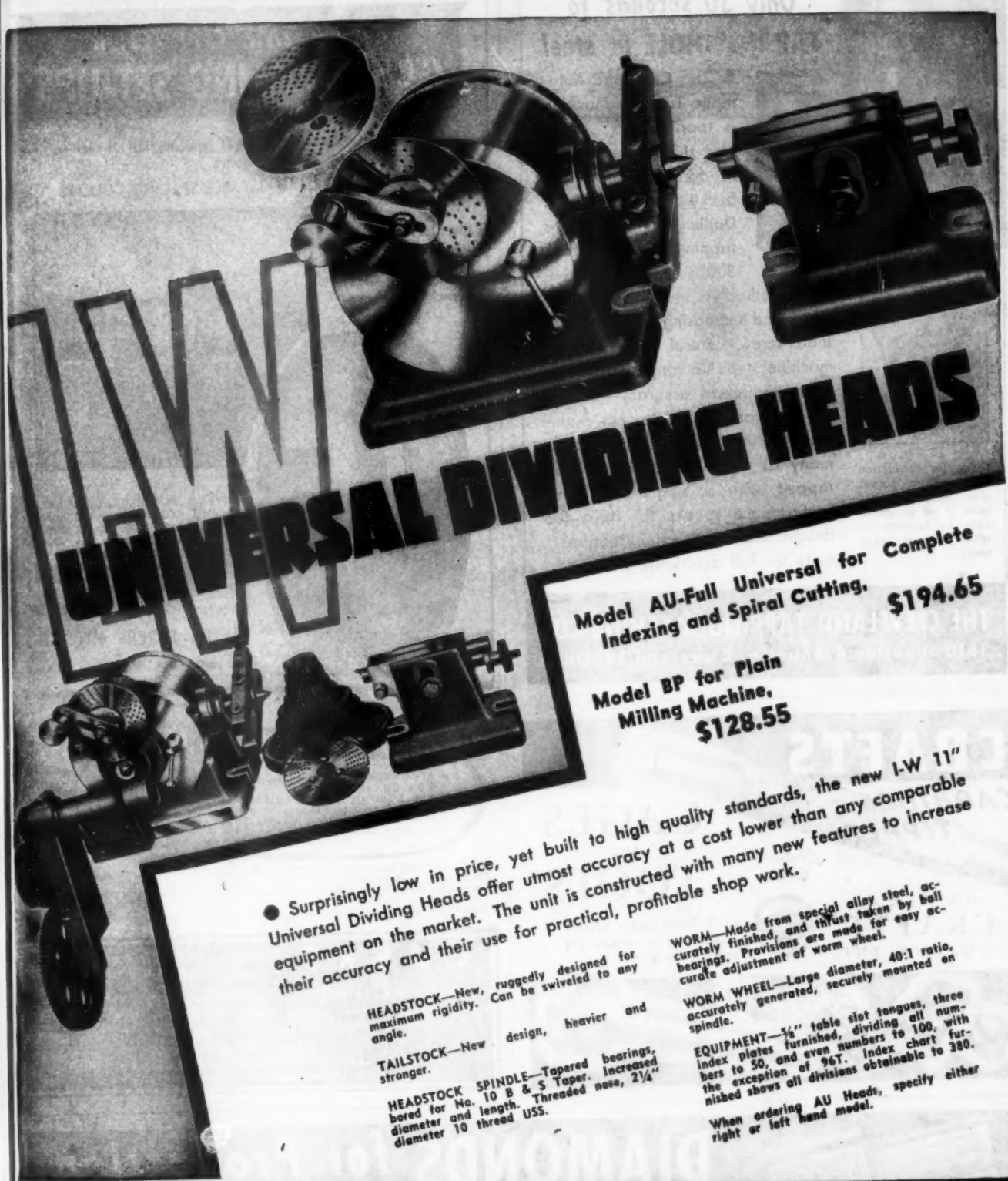

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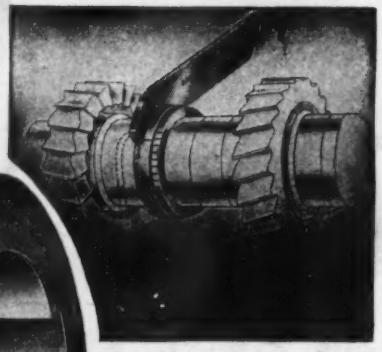

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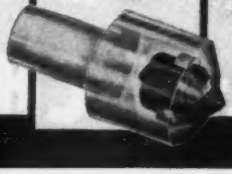

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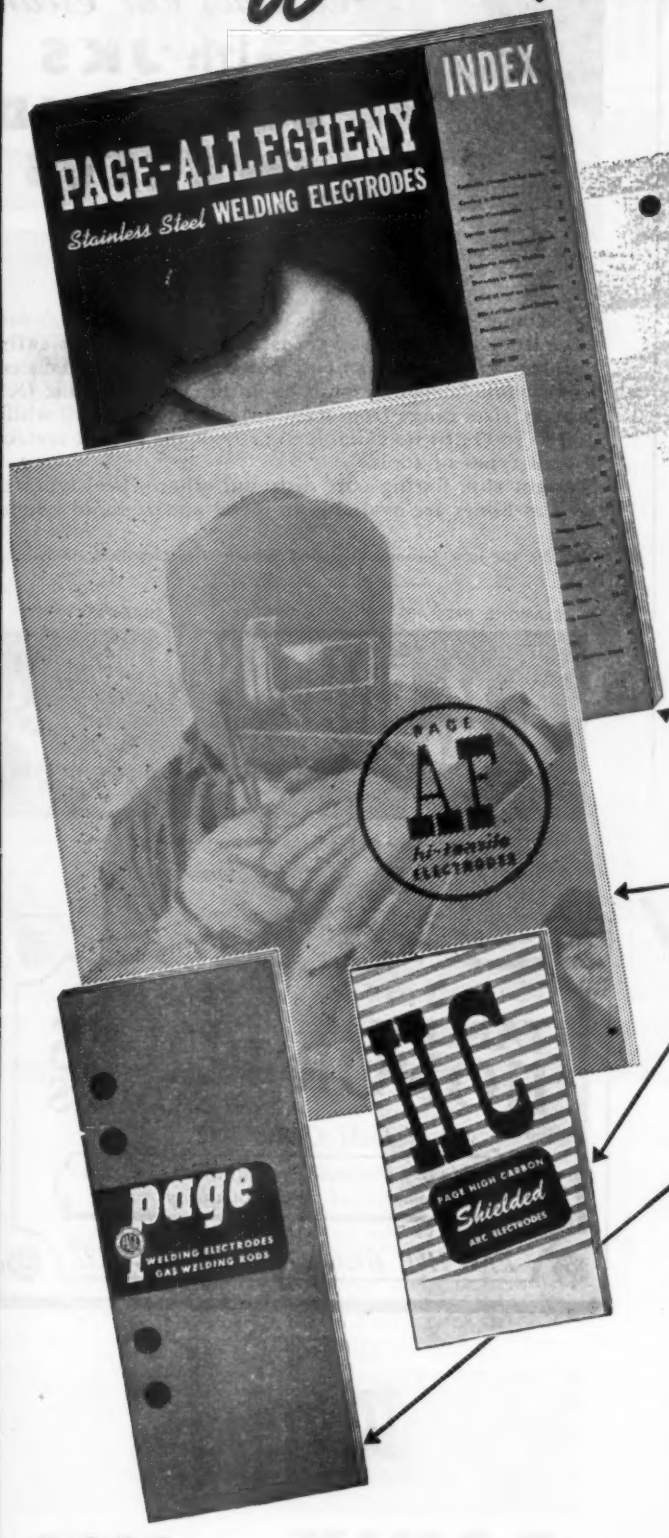

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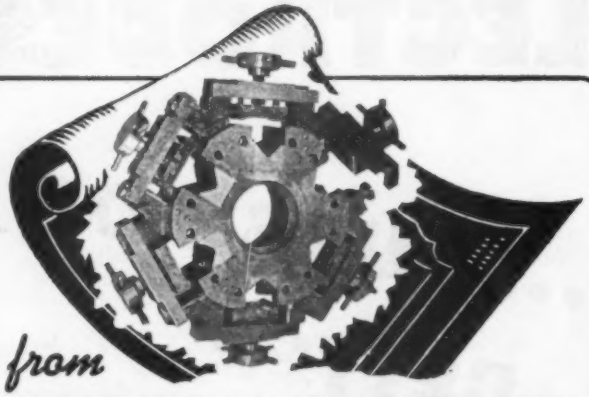

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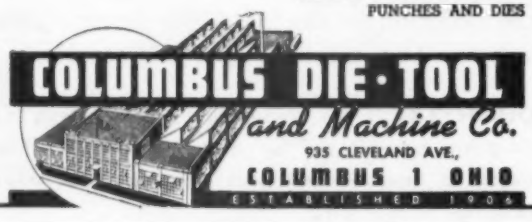

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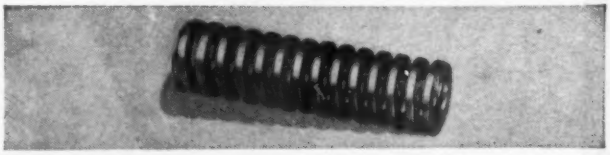

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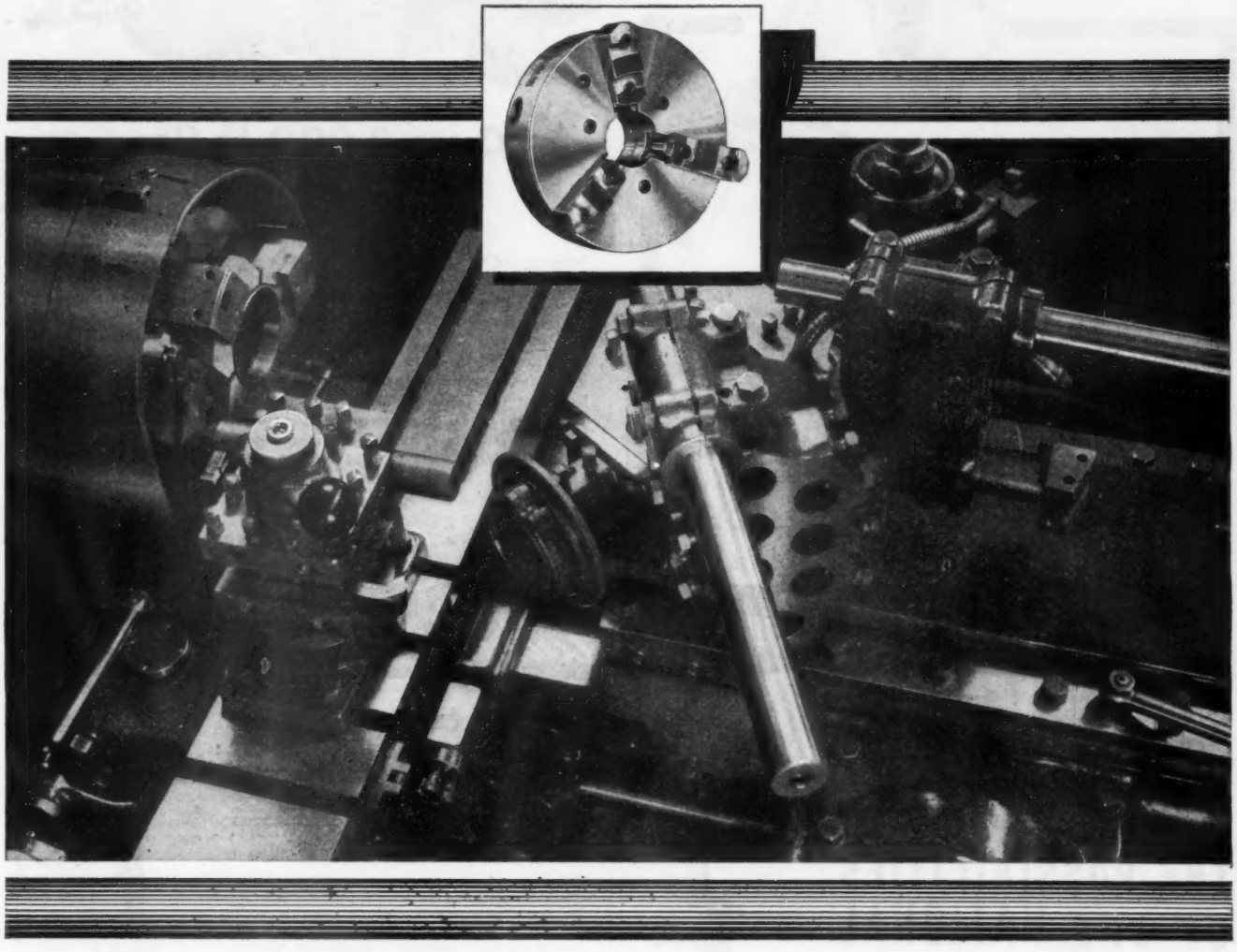

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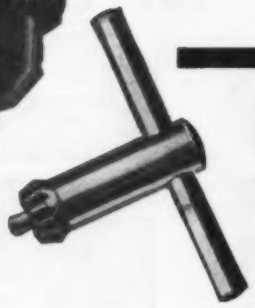

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THE POSSIBILITIES OF THE NATIONAL KEYSEATING MILLER *on Your Work*

Several widths of cutters can be used with each size miller and many different hole diameters keyseated with one tool through the use of eccentric bushings.

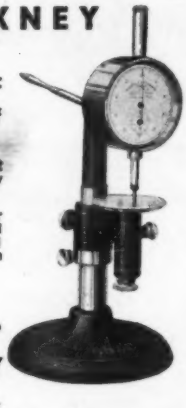
• Shops all over the country are solving difficult keyseating problems by chucking this attachment on their drill presses, radials and horizontal boring mills—and milling keyseats in pieces too large or bulky for convenient handling on keyseating machines.

The "National" goes through the hole once and mills keyseats with parallel sides and parallel with the axis of the bore. It's a big time and money saver and is available in standard stock diameters from ½" to 3½" for cutting lengths from 1⅞" to 12". It will keyseat in blind holes, taper holes, and offset holes. We also manufacture oil-grooving millers.

WRITE today for Catalog No. 15

NATIONAL MACHINE TOOL CO.
CINCINNATI, OHIO

RANDALL & STICKNEY
Universal Gauge



for rigid inspection of a wide range of parts . . .

An almost unlimited use is offered by this instrument for inspecting duplicate parts in quantity or any small parts with flat surfaces or recesses.

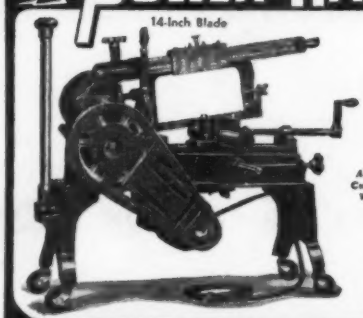
Use of standard blocks made possible by raising or lowering table increases capacity to take material up to 2" in height. Graduated to read to .001 inch; height 9¾"; weight 5 lbs. 1¼ oz.; depth from frame to spindle 1⅜".

Full details on request

Can be supplied with sliding head and table; also on a stand with throat 3" deep.

RANDALL & STICKNEY
Makers *Waltham 54, Mass.*

POWER HACK SAW ★



LOW PRICED
SELF-CONTAINED
PORTABLE
STURDY
READY TO WORK
ECONOMICAL

EXPORT DEPT.
1111 SO. FERRY BLD'G.
NEW YORK 4, N.Y.

WRITE FOR BULLETIN NO. 400

MILLER-KNUTH MFG. CO. OMAHA, NEB.

TO FIT EVERY REQUIREMENT

UNBRAKO

Reg. U. S. Pat. Off.

SOCKET SCREWS

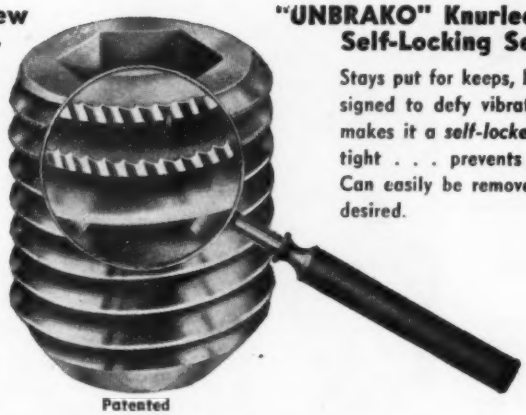
Knurling of Socket Screws originated with "Unbrako" years ago.

Send for the Catalog of "Unbrako" Socket Screw Products

Pat'd & Pats. Pend.

"UNBRAKO" Knurled Socket Cap Screw

Fills the bill for mechanics! Because the knurled head affords a "non-skid" grip for oily fingers. "Unbrako" Socket Cap Screw therefore can be screwed-in farther and faster . . . before using a wrench—speeds production, saves time.



Patented

"UNBRAKO" Knurled Point Socket Self-Locking Set Screw

Stays put for keeps, because it's specially designed to defy vibration! The knurled point makes it a *self-locker* . . . digs in and holds tight . . . prevents it from working loose. Can easily be removed and used as often as desired.

"UNBRAKO" Knurled Thread Self-Locking Set Screw

Another opponent of vibration . . . for use where a cup point screw is unsuitable. The knurled threads make this a *self-locker* and definitely prevent it from unwinding.

These screws in sizes from #4 to 1½" in diameter . . . full range of lengths. Write for the Catalog of "Unbrako" Socket Screw Products.

OVER 40 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA. BOX 4

JENKINTOWN, PENNA., BOX 4 BRANCHES: BOSTON • CHICAGO • DETROIT • INDIANAPOLIS • ST. LOUIS • SAN FRANCISCO

Federal RESISTANCE
SPEEDS Parts Production

IT'S an essential industry, teaching babies to walk, helping mothers to transport them; and when The Shuler Company of Cleveland, makers of the popular Shuler Baby-Walker, were given an OK to try to meet the tremendously growing demand, one problem was to increase production of the sturdy Shuler steel wheels...four to every walker.

A slight change in design, a standard Federal P1, 75 KVA Press Type Welder and a simple set of dies met the challenge... **more than doubled production** of the item.

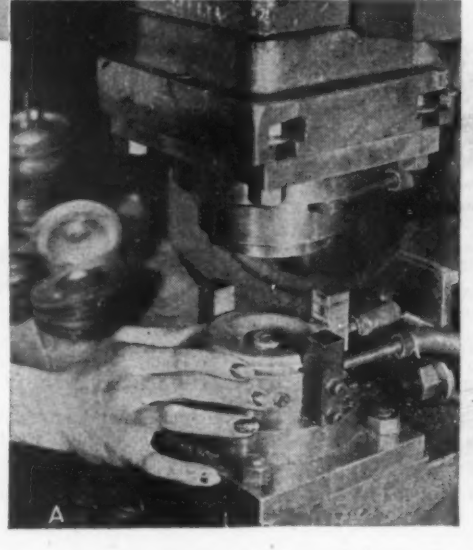
The wheels are made from identical stampings of mild steel. They had previously been spot welded, at a fairly good production rate. Straight thinking design and production heads at The Shuler Company combined their ideas with advice from a Federal applications engineer. Four small projections were added to the stampings, copper ring dies, made

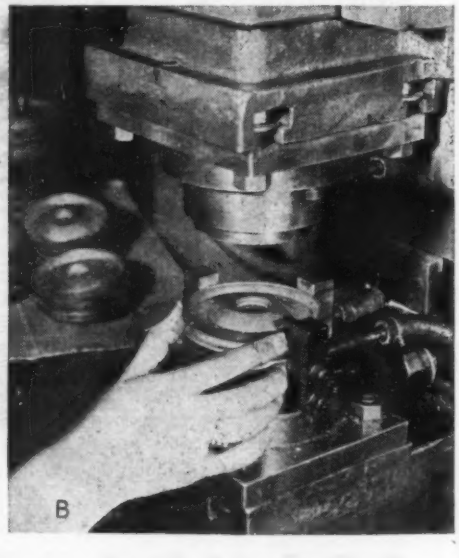
ABOVE . . . The Federal P1, 75 KVA Press Type Welder as installed at the Shuler Plant. At right, operating sequence . . .

A . . . Helper places first stamping in die, projections up.

B . . . Operator places second stamping, projections down. Projections contact face of opposite stamping.

C . . . A touch of the operator's foot on convenient switch completes the sequence, and another wheel blank. Less than three seconds from stock pile to tote box. Single operator can continue at approximately same speed while helper is moving up stock.





THE FEDERAL MACHINE AND

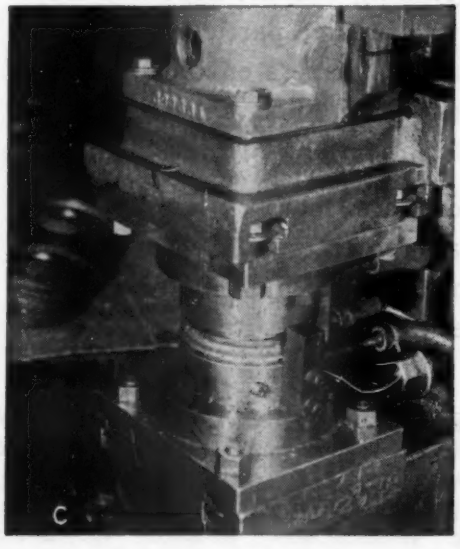
WELDING 100%

from alloy castings, installed on the standard Federal press welder, and the problem was solved. The new method, producing 1,000 wheel blanks per hour, is shown below in pictures that tell their own story.

Not a revolutionary idea, by any means, **but it doubled production on the needed item,** and that is typical of resistance welding possibilities throughout the metal working industry. A Federal Press Type Welder such as the one illustrated, or related models in suitable capacities, might have similar application to, let us say . . .

Instrument Assemblies . . . Gauge Cases . . . Electrical Fixture Parts . . . Lock Assemblies . . . Automotic Valve Components . . . Automatic Switch Parts . . . Radio Chassis Components . . . a wide variety of Hardware . . . Ventilator Grilles . . . Speedometer Casings . . . Ash Trays and other Novelties . . . Two Piece Ventilated Container Caps . . . Radio Tube Assemblies . . . Oil Cleaner Assemblies or what have YOU that might be profitably converted to resistance welding if the facts were known . . .

Federal Press Type Resistance Welders (you can spot weld on them, too) are described fully in Federal Bulletin 4520. Write for your copy today. Remember, in resistance welding, the name of authority is FEDERAL.



WELDER CO. 230 Dana Street WARREN, OHIO

VERSATILE MODERN PRODUCTION TOOLS

WELDERS WITHOUT PRIORITIES

Announcement is made by Sales Manager John E. Ponkow, of The Federal Machine and Welder Company, that his company is now in a position to accept unrated orders for resistance welders. While priorities still are all that the name implies, and important war production still is the first obligation, bookings are now being made and delivery dates assigned to a large number of orders outside of the critical category, Mr. Ponkow said. Delivery schedules while far from normal, are improving steadily.

"TAKE THE WELDER TO THE JOB"

In a large sheet metal shop two men were assembling an angle iron framework which was to be the skeleton for a stainless steel kitchen sink and cabinet installation for a large hotel.

"Why don't you spot weld some of that work?" asked a man standing with the shop foreman.

"How the . . . can you horse a bunch of awkward stuff like this through a spot welder?" one of the workers retorted. "And besides, all of our work is special, we don't have enough of any one assembly for that sort of work."

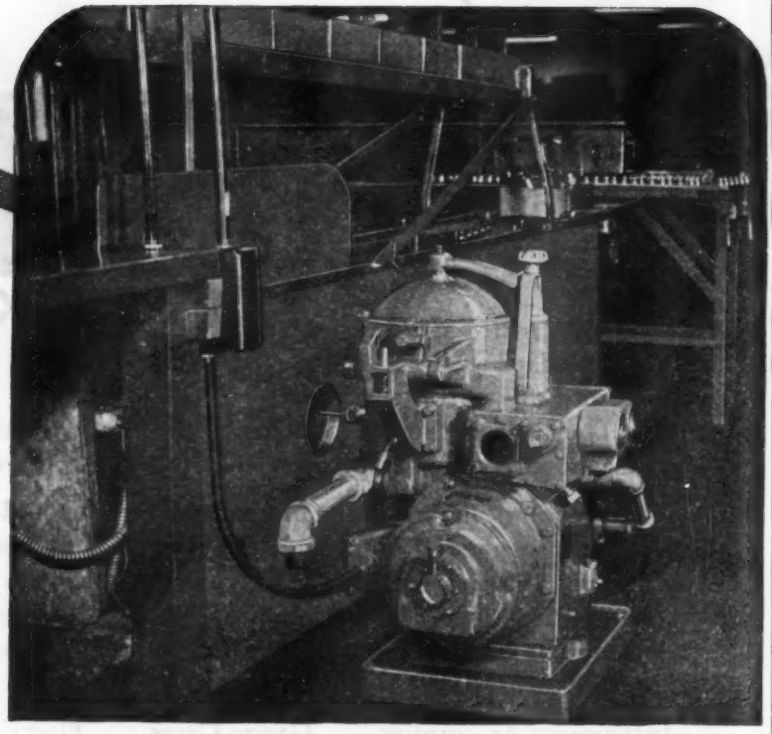
"You don't have to take the job to the welder, I'll show you how to take a spot welder to the job," the visitor said, and proceeded to demonstrate the application of portable, gun-type spot welders to the job. He also proved that they did not need to have long production runs to make this type of automatic resistance welder profitable. The caller was a Federal Welding Application Engineer, and those men now are using a Federal monorail suspended portable welder with a variety of special "guns" that speed up all kinds of sheet metal fabrication in which the shop specializes.

AUTOMATIC STUD WELDER

Welding certain types of lugs and studs to small machine mounts on a production basis sometimes turns out to be a bit of a trick. One solution which has proved a time and money saver is automatic resistance welding. A Federal press-type projection welder with a special fixture and automatic feed was set up for one motor company to produce mounts complete with studs or threaded lugs (set-up interchangeable to meet production schedules) at the rate of 600 per hour.

SPOT AND/OR PROJECTION WELDERS

The difference between spot welding and projection welding, and information on how one Federal resistance welder can be used interchangeably for either method is included in a new bulletin on press-type welders just released by The Federal Machine and Welder. This is one of the most versatile of all types of resistance welders. Title is "Federal Bulletin 4520."



As at
HOOVER BALL
and
BEARING CO.
ANN ARBOR, MICH.

Where DRY OIL *is* ESSENTIAL

RELY ON A DE LAVAL!

WHEN coating ball bearings with slushing compound to prevent rust, it is absolutely necessary that the oil be kept free from all moisture and sediment. At Hoover Ball & Bearing Company, slushing oil is continuously by-passed from the slushing tank through a De Laval "Uni-Matic" Oil Purifier. Any water that might get into the oil is instantly removed by centrifugal force, and Hoover bearings are given the full benefit of clean, dry slushing oil.

Slushing oil is only one of many factory oils that can be kept in condition better by means of a De Laval Oil Purifier. Test oils, for example, from which De Lavals continuously remove metallic particles, grit, dirt and water, insure maximum reliability and safety in testing. Cutting oils freed of minute metallic particles by a De Laval Oil Purifier can be used over and over again with equally good results.

And grinding coolant kept free from metallic or abrasive particles by means of De Laval Clarifiers enables grinding to closer limits, finer finishes, longer wheel life, and reduced dressing costs.

● There are many other uses for De Laval centrifugals . . . write for your copy of Bulletin MM-1, sent free on request.

DE LAVAL

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 19
THE DE LAVAL COMPANY, Limited
MONTREAL PETERBOROUGH WINNIPEG VANCOUVER

PURIFIERS AND CLARIFIERS FOR FACTORY OILS

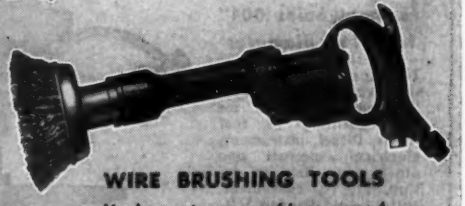
CLECO TOOLS

for
TODAY'S JOB
and
TOMORROW'S

ROTARY GRINDERS
Ruggedly built, extra powerful. Many sizes, with straight or spade handles. Bulletin 80.

RIVETING HAMMERS
For heavy duty work with hot rivets. Three styles of handles. Bulletin 82.

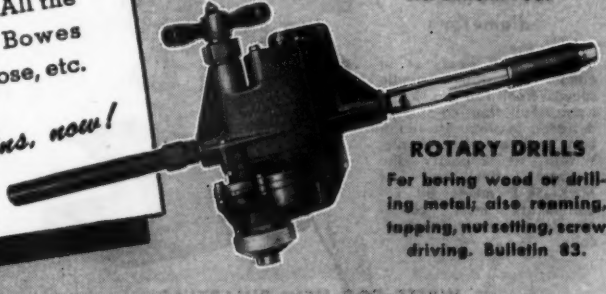
RIVET BUSTER
To cut off rivet heads, break down walls, drive spikes and small drift bolts. Bulletin 82.



WIRE BRUSHING TOOLS
Husky rotary machines, used with radial wire brushes or cup wire brushes. Bulletin 80.

SCALING TOOLS
Handy hammers for cleaning paint, weld splash, scale from metal surfaces, etc. Bulletin 758.

RAMMERS
For back fill tamping of earth excavations, and for ramming in the foundry. Bulletin 768.



ROTARY DRILLS
For boring wood or drilling metal; also reaming, tapping, nut setting, screw driving. Bulletin 83.

• Need tools for war work now? Or are you planning your requirements for post-war jobs? . . . The complete Cleco line offers the *right* tool for many major operations. Fast workers, that take it easy on air consumption, Cleco Tools are the product of over 50 years experience in this field . . . All the accessories, too — Bowes Couplings, valves, hose, etc.

Write for Bulletins, now!

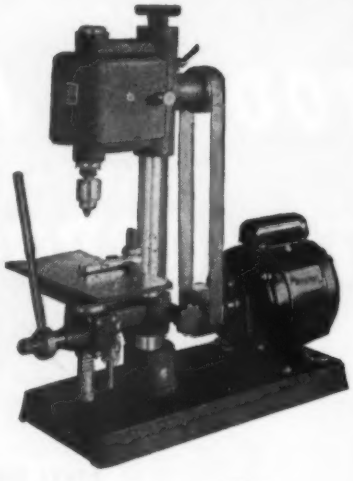
THE CLEVELAND PNEUMATIC TOOL CO.
3781 EAST 77TH STREET • CLEVELAND 5, OHIO
Branch Offices in All Principal Cities

When Minimum Fractional Precision Is Imperative

HAMILTON MACHINES

for better seeing · better feeling · better drilling

HAMILTON SENSITIVE TAPPER



More units per hour. For tapping operations on instrument, camera, watch, clock, business machines and all other precision work. Smooth, easy operation *without breakage of even the smallest taps.*

Fool-proof; noiseless, head mechanism completely hooded so operator is protected from oil and dirt.

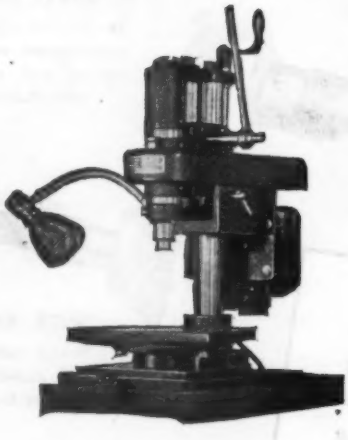
For any threadable material. From smallest and finest thread, up to and including 10-32.

• • •

HAMILTON "VARIMATIC"

Super-Sensitive Drilling Machine

for small holes .004" to 5/16" diameter



Two speed ranges, infinitely variable. Built with "instrument precision" for finest drilling in tool rooms, Diesel, instrument, electrical, aircraft and other uses. Bold in design, sturdy, convenient, perfectly constructed. Self-contained drilling unit swings radially on column and locks to any position. From 840 to 9300 r.p.m.

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HAMILTON "MAXI-JR-E"

Super-Sensitive Drilling Machine

for small holes .004" to .250" diameter

May be used singly or in gangs. Possible spindle speeds from 750 to 12,000 r.p.m. Full floating spindle designed to eliminate radial belt pull on the spindle. Within its capacity the extreme flexibility of MAXI-JR-E meets all requirements · most conveniently and most economically.

WRITE FOR NEW BULLETINS

The Hamilton Tool Co.

830 NINTH ST. HAMILTON, OHIO

BUZZER *Gas* BURNERS

For Many Industrial Gas Uses

NO BLOWER or POWER NECESSARY
. . . just connect to gas supply

Pipe Burners

Nozzle Burners

Ring Burners

Designed to solve numerous Industrial Gas applications, "BUZZER" Burners are unexcelled for Efficiency, Economy, Simplicity and Flexibility. Large variety of models available.

Send for the "BUZZER" Catalog showing complete line of Industrial Gas Burners, Furnaces and other equipment.

CHARLES A. HONES, INC.

121 So. Grand Ave. Baldwin, L. I., N. Y.

Wanted:

RADIO PROCESS ENGINEER

Southern California manufacturer has immediate opening for practical, experienced process engineer thoroughly familiar with planning commercial radio or similar assembly. Moderately high production.

Must be able to lay out assembly lines for efficient manufacture and to design jigs and tools required. Should be familiar with time and motion principles as applied to line assembly work.

Five to ten years experience with major broadcast receiver manufacturer desirable. Familiarity with design of test equipment is preferred, but not required. Age 30 to 40.

Please fully outline qualifications and state salary required. Manufacturer will arrange interview and transportation to coast. Address air mail reply to Shaw Research Bureau, 815 W. 5th St., Los Angeles 13, California.

ANOTHER TYPICAL ENGINEERED REBUILDING JOB

by Simmons

PRODUCTION LIST

ITEM NO. 6153 DATE LISTED
DESCRIPTION 90" Niles Rheni Latho BLDG. NO. BAY NO.
DEL'Y PROMISED FOREMAN

PART NO.	QN.	DESCRIPTION	MATERIAL TO BE MADE BY	REMARKS
1		Machine Bed		
2		Machine Tailstock Bearing Surfaces		
3		Machine Spindle Bearing Surfaces		
4		New Headstock Bearings		
5		New 6' Gear Box		
6		Ramsey Chain Drive		
7		Machine Tailstock Quill		
8		Machine Headstock Quill		
9		Two New Centers		
10		New Screws & Nuts for Headstocks		
11		New Screws & Nuts for Tailstock		
12		New Main Drive Faceplate Gear		
13		Two New Drive Pinions		
14		Recut Main Drive Gear		
15		New Pinion Drive for Main Drive		
16		New Ratchets and Links		
17		New Feed Arm		
18		Two New Sleeves		
19		New T Bolts		
20		Machine Cross Slide R & L		
21		Machine Intermediate R & L		
22		Machine Tool Slide R & L		
23		Four New Gibs		
24		Four Screws Toolslide & Cross-slide R & L		
25		Light Cut on Drive Shaft		
26		Light Cut on Reducing Shaft		
27		Machine Bearing Drive End		
28		New Bushing Drive Shaft		
29		New Bushings Main Pinion Drive		
30		Two New Spacer Washers		
31		Eight New Spacer Washers		
32		8-1 3/8 Bolts		
33		Two Space Washers, Cross Slide		
34		Machine Bore Gear, Recut Key		

PRODUCTION LIST

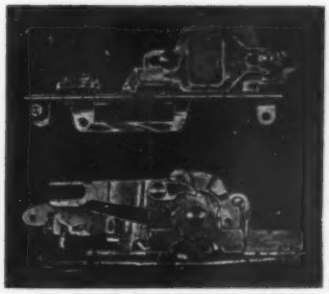
ITEM NO. DATE LISTED
DESCRIPTION BLDG. NO. BAY NO.
DEL'Y PROMISED FOREMAN

PART NO.	QN.	DESCRIPTION	MATERIAL TO BE MADE BY	REMARKS
35		Machine Pin, Bearing		
36		Eight New Jaws		
37		Eight New Dogs		
38		Eight New Adjustable Screws		
39		Eight New T Bolts		
40		Two New Nuts on Cross Slide Screw		
41		Clean up Cross Slide Nut		
42		Two New Combination Feed Screws & Nuts		
43		Two New Head & Tail Center Spindle Screws		
44		New Rapid Traverse Screw & Nut		
45		Three Spacer Collars for Rapid Traverse Bushing		
46		Rapid Traverse Gear		
47		Two Eccentric Driving Collars		
48		Two Bearings for Driving Shaft, Feed		
49		Two Collars for Driving Shaft, Feed		
50		Two T Bolts for Driving Shaft, Feed		
51		New Coupling for Drive Shaft		
52		Eight T Bolts Intermediate		
53		Eight Nuts for Bolts		
54		Eight Washers for Bolts		
55		Two Bore & Bush Cross Slide		
56		Brass Plates on Tailstock		
57		Brass Plates on Headstock		
58		All Cross Slides Scraped & Fitted		

SIMMONS MACHINE TOOL CORP.
1759 NORTH BROADWAY • ALBANY 1, N. Y.

MANUFACTURERS OF STANDARD AND SPECIAL-PURPOSE MACHINE TOOLS • ENGINEERED REBUILDING **SIMMONS**

CONTRACT WORK



STAMPINGS and ASSEMBLIES

We can make long or short runs in any metal. Our modern equipment and methods, backed by 50 years of experience, are your guarantee of satisfaction. Our manufacturing facilities also include screw machine products, tools, dies, jigs and fixtures.

"Greater Savings with Greist"

Your order is assured of quality workmanship by skilled mechanics. We will furnish prompt quotations on your blueprints or samples. Write us today!

THE GREIST MFG. CO. 546 Blake Street New Haven, Conn.

METAL STAMPINGS

• TOOLS • DIES •

PERMANENT MAGNETS

HEAT TREATING

THOMAS & SKINNER

STEEL PRODUCTS CO.

1103 E. 23rd St. INDIANAPOLIS, IND.

MACHINES AND PARTS, SPECIAL TOOLS, ETC.

to your specifications

SPECIAL ENGINEERING WORK

. . . on Contract

It will pay you to investigate our facilities. As designers and builders of wire and ribbon stock forming machines we can offer you skilled and experienced assistance. Send us your blueprints or samples for prompt quotations.

We also solicit your bids for cam milling

THE A. H. NILSON MACHINE CO. Bridgeport, Conn.

WIRE AND METAL SPECIALISTS

in round, flat, square and special shaped wire in all metals.

LARGE PRODUCTION CAPACITY

Plating and finishing.

EASTERN TOOL & MFG. CO.

BLOOMFIELD, N. J.

MOULD MAKERS

Specializing in molds for the Rubber Industry also facilities for automatic screw machine work up to 11/16.

M & N Machine Tool Works

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AVAILABLE SCREW CAPACITY

¼ to 4½ Automatic and Hand Screws

Including Necessary Secondary Operation

Forward Samples and Blueprints for Quotations

BRIDGEWATER SCREW PRODUCTS CO., Bridgewater, Mass.

Long runs for Turret Lathe & Milling Machines.

VAHL ENGINEERING CO.

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• TOOL DESIGNING AND BUILDING • MACHINES DESIGNED • IDEAS DEVELOPED • PROMPT—EFFICIENT—SERVICE • • REASONABLE CHARGES •

OLD COLONY ENGINEERING CO.

180 Weeden St. • Pawtucket, R. I.
P.O. Box 672 • Tel. Blackstone 2610

Write — Phone or Telegraph

SCREW MACHINE PRODUCTS

STEEL—BRASS—ALUMINUM

MACHINE SHOP FACILITIES

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National Tool & Machine Co.

426-428 W. 55th St., N. Y. 19, N. Y.

WANTED—WORK (PEACETIME)

ON CONTRACT BASIS TO YOUR SPECIFICATIONS

We offer a complete service for the Engineering, Development, and Manufacture of metal parts, assemblies, and machines.

Fully equipped, modern machine shop with complete production setup for all types of machine work.

Send blueprint or sample for prompt quotation without obligation.

SOUTH SHORE MACHINE & TOOL WORKS, INC.

Merrick Road Seaford, New York

BUILDERS OF SPECIAL MACHINERY TOOLS & DIES

THE SPECIALTY MACHINE TOOL & DIE CO.

923 Market St. (Rear) Wheeling, W. Va.

PATTERNS in WOOD and METAL

For All Kinds of Castings, Large or Small

MATCH PLATE WORK A SPECIALTY

GENERAL PATTERN WORKS

2233 Rusk Street Cincinnati, Ohio

Put Your Idle Capacity to Work

Hundreds of metal-working companies are finding profitable business today outside their regular lines. Tell metal-working America—the 100,000 readers of **American Machinist**—about your facilities. Write

Departmental Staff

AMERICAN MACHINIST

330 W. 42nd St., New York 18, N. C.

PRECISION FORM GRINDING

Specialists in grinding Circular and Flat FORM TOOLS, FORM Counterbores, FORM Flat-Drills, and related types of FORM grinding. Also step-grinding of Tungsten and Molybdenum Rods.

Send Prints for Quotation and Delivery

J. & S. TOOL CO.—477 Main St.—E. Orange 1, N.J.
(Makers of J.&S. Radii & Eagle Dressing Tools)

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Hundreds of metal-working companies are finding profitable business today outside their regular lines. Tell metal-working America—the 100,000 readers of **American Machinist**—about your facilities. Write for rates.

CONTRACT WORK DEPARTMENT

AMERICAN MACHINIST

330 W. 42nd St., N. Y. 18, N. Y.

SEARCHLIGHT SECTION

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10 cents a word minimum charge $2.00.

(See ¶ on Box Numbers.)

POSITIONS WANTED (full or part-time individual salaried employment only), ½ above rates.

PROPOSALS, 50 cents a line an insertion.

INFORMATION:

BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals.)

DISPLAYED RATE:

The advertising rate is $6.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page. A.M.

NEW ADVERTISEMENTS received by 10 A.M. Aug. 29th will appear in the issue of Sept. 13th subject to limitation of space available

WANTED

TOOL AND DIE MAKERS—experienced on all types blanking, forming, and progressive dies.

MACHINISTS—with experience in all around machine and tool work, and tool grinding.

HEAT TREATER—with experience on heat treating tools and dies.

Permanent full-time employment with excellent working conditions in one of the South's leading plants. Our company is at present time on vital war work, but we have a splendid postwar future. We will assist in securing living facilities.

KANOY AND SONS MACHINE COMPANY

4111 Thrift Road Charlotte, N. C.

WANTED

MASTER MECHANIC

An old, well established organization in New Jersey, near New York City, desires the services of a master mechanic, experienced in all phases of manufacturing aluminum containers, including die making, knowledge of work planning, modern work methods and shop practices, and be capable of assuming supervisory authority. Applicants should state full particulars, such as details of experience, salary expected, references, age and other data of background in letter of application. All correspondence will be treated strictly confidential.

P-365, AMERICAN MACHINIST

330 W. 42nd Street New York 18, N. Y.

TOOL DESIGNERS

Should have experience designing Jigs, Fixtures, Stamping Dies, Plastic Molds, Gages, Cutting Tools, etc. on small precision parts. Must be experienced in one or more of the above classifications. Large well established N.E. Ohio manufacturer now fully engaged in vital war work. Excellent postwar opportunities. Living conditions good in small town or near by medium sized city. W.M.C. rules and regulations apply. If qualified address replies to

P-378, AMERICAN MACHINIST

520 N. Michigan Ave., Chicago 11, Ill.

WANTED

MECHANICAL ENGINEER

Must be thoroughly experienced in all gear manufacturing problems as well as designing; only those with extensive gear experience need apply. Exceptional postwar opportunity. Write full history including name of university and year graduated; names and addresses of all former employers; age; salary desired.

P-345, AMERICAN MACHINIST

330 W. 42nd St., New York 18, N. Y.

CHIEF ENGINEER

MECHANICAL ENGINEER EXPERIENCED IN DESIGN AND DEVELOPMENT

Practical shop background and executive experience essential.

Key position in a large company.

Ample responsibility and opportunity with a fitting salary.

Essential work.

Has no reconversion problems.

Location metropolitan New York.

State age, education, experience and present salary.

Box AM-8042, 113 W. 42, N.Y.

POSITIONS VACANT

DESIGN ENGINEER—Established Connecticut manufacturer needs graduate engineer or equivalent experienced in design of automatic machinery. Printing press and some tool, jig and fixture experience desired but not essential. Postwar opportunity with company whose products have international distribution. State age, marital status, education, experience, present salary and salary expected. P-352, American Machinist, 330 W. 42nd St., New York 18, N. Y.

MECHANICAL TUBING Executive young or middle-age individual capable of supervising gas weld continuous tube rolling equipment as well as all details concerning hydraulic press bending operation, estimating of automotive exhaust pipe, etc. Give experience, age, past performance and salary expected. Southern Ohio location. P-374, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

OPPORTUNITY: A peace time position is now open for a supervisor of tool and die designing and making apprentices. Desirable qualifications to be considered are college education, natural talent for teaching, actual working experience with machine shop or tool room equipment. This is an excellent opportunity for a married man in early thirties, with initiative, self reliance and a flare for doing things thoroughly, to "grow up" with a new project under the initial direction and guidance of top management. Moderate salary to start, leading to a permanent, responsible and well paying position for the long pull with a medium sized tool shop in business for 22 years. Address P. O. Box 387, Dayton 1, Ohio.

ADVERTISING MAN wanted who is thoroughly familiar with trade paper as well as direct mail advertising and catalogue work by machine tool company. Give education, experience, age and salary expected. Information will be treated as strictly confidential. Good opportunity for first class man. P-385, American Machinist, 330 W. 42nd St., New York 18, N. Y.

WANTED ESTIMATOR—An old, well established tool shop in northern Ohio, desires the services of a man capable of estimating gauges, jigs, fixtures, dies and special machinery. Position permanent. Should you have this ability, write giving full background as to experience, education, draft status and former positions held. Compensation open. Write P-393, American Machinist, 330 W. 42nd St., New York 18, N. Y.

CIVIL OR Mechanical draftsman wanted. Must be experienced in plant layout and building design, preferably with paper mill experience. Plant located in Tennessee. P-400, American Machinist, 330 W. 42nd St., New York 18, N. Y.

WANTED EXPERIENCED machine tool designers and detail draftsmen. Apply by letter giving full information of training, experience and salary required. WMC rules apply. Giddings & Lewis Machine Tool Co., Fond du Lac, Wisconsin.

WANTED: TOOL DESIGNERS. Graduate engineer or equivalent, specific experience in design of tools, fixtures, gages, etc., for manufacture of small interchangeable metal parts and a definite interest in design problems. Good postwar prospects. State age, marital status, details of education, experience, draft status, present salary and expected salary. Enclose recent photograph or snapshot. Applicants must be able to obtain statement of availability. Remington Arms Company, Inc., Personnel Relations Division, Bridgeport, Conn.

WANTED: GUN Designers. Graduate engineer or equivalent, thoroughly trained in the fundamentals of mechanical engineering and in the design and development of sporting arms or small interchangeable metal parts. Ability to recognize and analyze weaknesses in design of mechanisms and invent simple, sturdy substitutes. Ingenuity and a liking for sporting arms are desirable. Good post-war prospects, state age, marital status, details of education, experience, draft status, present salary and expected salary. Enclose recent photograph or snapshot. Applicants must be able to obtain statement of availability. Remington Arms Company, Inc., Personnel Relations Division, Bridgeport, Conn.

WANTED: MACHINE Design and development engineers. Graduate engineer or equivalent, experienced in the design and development of automatic and semi-automatic machines concerned with manufacture of sporting arms and sporting arms ammunition or with manufacture of small interchangeable metal parts. Creative ability and initiative are essential and a sound training in economic evaluations of manufacturing processes. Good post-war prospects. State age, marital status, details of education, experience, draft status, present salary and expected salary. Enclose recent photograph or snapshot. Applicants must be able to obtain statement of availability. Remington Arms Company, Inc., Personnel Relations Division, Bridgeport, Conn.

MECHANICAL ENGINEER wanted with experience in power plant and maintenance, preferably with paper mill experience. Plant located in Ohio. P-399, American Machinist, 330 W. 42nd St., New York 18, N. Y.

(Continued on page 260)

WANTED

ENGINEERS

MACHINE

DEVELOPMENT

Graduate engineer or equivalent, experienced in the design and development of special and experimental machines. Men with creative ability required, experienced in such lines as automatic, semi-automatic, or ordnance equipment. Must be thoroughly acquainted with modern methods and shop practices and capable of developing new ideas in conjunction with modern mechanical laboratory facilities.

State age, marital status, details of education, experience, draft status, present salary and salary expected. Enclose recent photograph or snapshot.

Post-war opportunity.

Applicants must be able to obtain Statement of Availability.

E. I. du Pont de Nemours & Company, Inc.
Personnel Division
Wilmington 98, Delaware

POSITIONS VACANT

WORKS MANAGER for machine tool rebuilding plant. Expansion plans include special machinery manufacturing. Engineering and management qualities and machine tool experience required. Modern plant. Progressive management. Pleasant Eastern location. P-401, American Machinist, 330 W. 42nd St., New York 18, N. Y.

EMPLOYMENT SERVICE

SALARIED POSITIONS $2,500-$25,000. Post-war plans are creating lifetime opportunities now. This thoroughly organized confidential service of 35 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated, through a procedure individualized to each client's requirements. Several weeks are required to negotiate and each individual must finance the cost of his own campaign. Retaining fee protected by refund provision. Identity covered and present position protected. Plan now for post-war security. Send only name and address for details. R. W. Bixby, Inc., 266 Delward Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

EXECUTIVE WITH diversified experience in machine work, metal stamping, welding, gray iron casting and assembly. Have been in charge of design and construction of tools, dies, jigs, fixtures and special machinery for the past 3 years. Graduate Mechanical engineer. Age 47. Healthy and very active Machine Tool work, Chief engineer and/or master mechanic position desired. Or what have you to offer PW-375, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

DEVELOPMENT ENGINEER (M.E.) Five years in research department large industrial concern developing new automatic production machinery, additional five years development work on mechanical and hydraulic presses and automatic container machinery. Experienced in supervision and shop methods. Analysis and theory a speciality. Responsibility essential. Age 33. PW-376, American Machinist, 330 W. 42nd St., New York 18, N. Y.

WANTED

INDUSTRIAL CONTROL ENGINEER

We are interested in securing an electrical engineer to develop industrial control apparatus.

Applicant should be familiar with competitive designs, and have working knowledge of tests and working methods. Underwriter's requirements and NEMA standards for electric motor control.

Excellent opportunity to qualify for a permanent supervisory position in Engineering Department of an expanding organization well established in the automotive electrical and magnetic relay field. In applying give age and complete resume of experience.

R-B-M MANUFACTURING CO.
Division Essex Wire Corp.
LOGANSPORT INDIANA

POSITIONS WANTED

PLANT EXECUTIVE or tool engineer. Twenty-three years diversified manufacturing and executive experience. Thorough knowledge manufacturing procedures, modern production methods, planning and meeting schedules, processing and tool design. Experienced in metal stampings, precision machined and fabricated products, machine tools and general jobbing. Practical tool and diemaker. Age 41. Excellent employee relation record. Technical education. Desires executive position with small or medium size company. PW-388, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

SALES ENGINEER—Age 49, experienced in sales, design and manufacture of all types of tooling. 12 years experience with carbide tooling. Has practical shop and sales executive experience. PW-394, American Machinist, 330 W. 42nd St., New York 18, N. Y.

PURCHASING EXECUTIVE: with engineering and shop management training. Excellent organizer and supervising of personnel. Long successful record of accomplishment coordinating the purchasing and planning depts. of several divisions for national companies manufacturing heavy precision machinery. Familiar with all the procurement problems involved with modern production. Available after Aug. 15th for key position with an aggressive and responsible manufacturer. Location preference East. PW-390, American Machinist, 330 W. 42nd St., New York 18, N. Y.

MANAGEMENT ENGINEER for stiff competitive conditions. Initiative and original thinking, backed by proven sound judgment, in addition to unusually broad experience in reorganization, cost control and production. Thoroughly qualified for reconversion task on permanent basis. PW-402, American Machinist, 330 W. 42nd St., New York 18, N. Y.

CHIEF ENGINEER. Eighteen years of broad experience in developing and designing portable pneumatic and electric tools, small electric driven mechanisms and light machine tool equipment. Electrical and mechanical engineer. College graduate, age 42. Experience includes product, tool and machine design. Practical man well versed in modern industrial designing. A chief engineers position is desired with a small to medium size plant manufacturing light industrial equipment or similar line. PW-404, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

Mechanical Engineer Wanted

Medium sized textile plant in Southern Massachusetts with modern machine shop seeks young mechanical engineer to take charge of technical research and development of plant equipment and procurement of machine parts—and to develop sales service for electronic induction heating unit for flash brazing, soldering, hardening, etc. Excellent opportunity for advancement for right man who seeks permanent position with progressive firm.

BOX #583, 1474 Broadway
New York 18 New York

WANTED

MACHINE DESIGNERS

Experienced on the design of special machinery. Excellent opportunity for first class men interested in steady positions.

Only men 35-55 with a record of successful achievements will be considered. In replying furnish information preliminary to a conveniently arranged interview.

THE TAFT-PEIRCE MFG. CO.
Woonsocket, R. I.

WANTED

PRODUCTION MANAGER

Man experienced in planning, scheduling machine loading and inventory control with experience in small lot production. Machine Shop and sheet metal experience an asset. Prefer man looking for post war security rather than salary.

P-335, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

WANTED

CHIEF INSPECTOR

Man experienced in inspection of all types of precision gears. Must be familiar with all types of checking equipment and well grounded in gear cutting. Write fully giving details of experience, education and salary requirements.

P-396, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

WESTINGHOUSE ELECTRIC CORPORATION

needs two experienced plant planning and materials handling engineers. Adequate salary and assured future for the right man. Wire or write Supervisor, Technical Employment, 306 Fourth Avenue, Pittsburgh, Pennsylvania, for application.

WANTED

ASSISTANT GENERAL MANAGER

Man experienced in all phases of precision gear cutting in small well-equipped plant. Excellent opportunity for man with all-round gear experience. Write fully giving details of experience, education and salary requirements.

P-397, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

SEARCHLIGHT SECTION

ASST. CHIEF ENGINEER

Excellent salary; permanet position; ideal working conditions; department expanding. Must have administrative experience; M. E. or E. E. Degree; be familiar with product design of small mechanical equipment, modern shop practice, capable supervising mechanical design, checking, specification writing, maintaining drafting standards. Supervise engineering department and small model shop. Serve as assistant chief engineer and chief draftsman. Age 32-45. List briefly qualifications, experience, personal history, salary desired. Reply to

DITTO, INC.
2243 W. Harrison St., Chicago 12, Ill.

POSITION VACANT

Designer, automatic machine. Highly experienced. Part time. Downtown Manhattan. Top salary.

P-395, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

(Continued from page 260)

REPRESENTATIVES AVAILABLE

EXPORT SALES Engineer. Machine tools, machinery, engineering products. Twenty years domestic and foreign selling experience. In contact wth all important foreign buying and export problems and finance, also substantial foreign manufacturing facilities if required. Now free to represent manufacturer or corporation. RA-405, American Machinist, 330 W. 42nd St., New York 18, N. Y.

POWER PRESS and can-machinery. Sales, engineering, designs and production personnel representing complete British organization, American-trained, wish to operate as sales and/or manufacturers in Great Britain for an American company. Guarantee finest sales connection Great Britain, including automobile, canning and general sheet metal industries. RA-406, American Machinist, 330 W. 42nd St., New York 18, N. Y.

GRADUATE ENGINEER, twenty years equipment and mill supply sales, desires additional lines for Southwest area. Acme Engineers, Box 5155, Houston 12, Texas.

CAPABLE SALES Engineer with contacts in Ohio, and Michigan, wishes to represent good company whose products require an able engineer and designer. RA-407, American Machinist, 330 W. 42nd St., New York 18, N. Y.

SALESMEN AVAILABLE

RESPONSIBLE SALES Engineer, age 41, with proven record who is also A-1 designer desires connection with Midwestern or Eastern manufacturer of machines, or machine tools who now has or is contemplating a plant on the West Coast. Interested in position as sales manager where real engineering and design experience is essential. Will demand good salary. SA-408, American Machinist, 330 W. 42nd St., New York 18, N. Y.

EXPERIENCED ENGINEER with contacts in Ohio and Michigan can place some metal stamping, and production machining on commission basis. SA-409, American Machinist, 330 W. 42nd St., New York 18, N. Y.

BUSINESS OPPORTUNITIES

MACHINE SHOP, well equipped, established many years serving logging, sawmill, and farming area, Western Oregon college town. Columbia Engr. Co., Porter Bldg., Portland 4.

PATENTS FOR Sale out-right. Single action one operation drawing and trimming dies for deep or regular cylindrical, rectangular, irregular shape articles with or without a flange. Dies in service can be rebuilt to include this device at very moderate expense. Burnett Menkin, 33-37 70th St., Jackson Heights, Long Island, N. Y.

PATENT ATTORNEY

PATENTS, COPYRIGHTS, Booklet, "General Information concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 453, 815-15th St., N.W., Washington 5, D.C.

SALESMAN WANTED

SALES AND FIELD ENGINEERING MAN

Factory agent representing nationally known grinding wheel manufacturer needs grinding wheel salesman who must be experienced in servicing and selling direct to steel mills. One with following in Ohio and western Pennsylvania districts will be preferred. Leads and full co-operation will be given—excellent commission arrangement with advances against commission. Write in detail your qualifications. This is a permanent and renumerative opportunity for good man. Address:

SW-381, AMERICAN MACHINIST
520 North Michigan Avenue Chicago 11, Ill.

SALESMEN WANTED

SALESMAN WITH following for diamond wheels and dressers very fine extensive line, West Coast, also East Coast. Box 560, 1474 Broadway, N. Y.

SALESMEN WITH trade acquaintance, make up to $100 per day selling surplus listings. Part—Full time. War Surplus Reporter, 20 East Jackson, Dept 208, Chicago.

REPRESENTATIVE WANTED

WANTED TO represent manufacture of mechanical and electrical products suitable for suburban and rural trade. Efficient sales, installation and maintenance services available, location Central Michigan. Bank reference. RW-292, American Machinist, 330 W. 42nd St., New York 18, N. Y.

TO ABLE, AMBITIOUS MEN

in Administration, Manufacturing, Engineering, Designing and Sales, who have good reasons for seeking wider opportunities, we offer **AT NO CHARGE** a dignified means of bringing their qualifications before interested employers.

To Industry we offer confidential Personnel Management Service on a fee or retainer basis.

CURT E. PATTON PERSONNEL ENGINEERS
53 W. Jackson Blvd. Chicago 4

PERISHABLE TOOL ENGINEERING

Basic instructions on designing & grinding the correct cutting, taper & back off angles on all high speed steel & carbide tipped cutting tools, for cutting cast iron, brass, aluminum & steel. These instructions can be used on the drafting board or in the shop to instruct the men on how to grind their tools correct, hence saving many dollars in time & material. These basic instructions will be sent to you complete and prepaid on receipt of $1.00 in cash or money order.

PERISHABLE TOOL ENGINEERS
3365 Louise St. Lynwood, Calif.

PROFESSIONAL SERVICES

Contract Termination Specialists
CONSULTANTS, ADVISORS, NEGOTIATORS
We will assume full charge of your
TERMINATED WAR CONTRACTS
Govt. Trained—Our charges included in post termination expenses.

ROBERT L. COLLUM ASSOCIATES
Room 837 11 West 42nd St., N. Y., N. Y.

WANTED
SALES ENGINEERS

To represent a modern gear manufacturing plant. Must have a degree in mechanical engineering as well as extensive selling experience in the gear industry. Write full details including name of university and year graduated; names and addresses of former employers; salary and territory desired and other pertinent details.

SW-410, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

WANTED
POST WAR PRODUCTS
TO MANUFACTURE

Well equipped metal manufacturing and fabricating plant of 25 years' experience, with skilled personnel capable of accurate design and production work, desires to contact parties who have machine parts or machines to manufacture.

WHALEY ENGINEERING CORP.
P.O. Box 1336 Norfolk 1, Va.

REBUILDING

LET US REBUILD AND MODERNIZE YOUR MACHINE TOOL

Our Methods of Rebuilding are similar to the Methods used by Manufacturers of New Machine Tools. Each Machine is Disassembled—Castings—Replaned—Hand-scraped—Spindles Reground and Bearings Refitted. All worn-out Parts Replaced—Including Gears—Relined and Machines Run in and Tested under Load. We therefore are in a position to guarantee accuracy for our Rebuilt Machines to be Similar to New Machines.

We will design and build your Jigs and Fixtures

VOLYN MACHINE TOOL WORKS, INC.
149 Broadway, New York 6, N. Y. 340 Tiffany St., New York 59, N. Y.
Tel. BE 3 0620—DA 9-8779—DA 9-8714

ABSOLUTE PUBLIC AUCTION

6 INDIVIDUAL HIGH PRESSURE POWER PLANTS!

(OPERATED BY THE GEORGIA POWER CO. AS RECENTLY AS DECEMBER 1944)

Sale To Be Held At The: **PIEDMONT HOTEL, ATLANTA, GA.**

SALE DATE: WEDNESDAY, SEPT. 26, 1945 at 11 A.M.

COMPRISING

23 HIGH PRESSURE BOILERS FROM 25 HP TO 600 HP, Water Tube, Oil and Coal Fired, 150# to 200# pressure.

ENGINE GENERATOR SETS—ROTARY CONVERTERS—11 TURBO GENERATORS FROM 500 KW to 2750 KW—STEAM & MOTOR DRIVEN EXCITERS—ELECTRIC MOTORS from 2 to 125 HP.

PUMPS—CIRCUIT BREAKERS—FEED WATER HEATERS— INSTRUMENTS—BLOWERS—FANS . . . and hundreds of other items too numerous to mention.

LOCATION OF PLANTS: 5 PLANTS LOCATED IN GEORGIA—at: Griffin, Athens, Americus, Augusta and Albany. 1 PLANT LOCATED AT: Langdale, Alabama.

INSPECTION: CONTACT MR. R. ROBBIN OR MR. D. CENTER at 349 Decatur St., S.E., ATLANTA, GA. Tel. No. WALNUT 9412 or MAIN 4947.

PLANTS NOW OPEN FOR INSPECTION

IMPORTANT: A COMPLETE AND DETAILED AUCTION CIRCULAR WILL BE SENT YOU FREE ON REQUEST—SEND FOR YOUR COPY NOW!

WRITE — WIRE PHONE

INDUSTRIAL PLANTS CORPORATION

Auctioneers Appraisers, Liquidators

90 WEST BROADWAY, N. Y. 7, N. Y.

316 S. LaSALLE ST., CHICAGO 4, ILL. (PITTS., PA.—TOLEDO, O.)

FOR SALE

200 H.P. Hor. 4 Pl. Motor Driven Pump, Capacity 78 G.P.M. 4000#
2300 Volt Synchronous Motor 3 Phase 60 Cycle
ALSO—75 H.P. Hor. 4 Pl. Pump—50 G.P.M.—2000#
50 H.P. Vert. Triplex Pump—24 G.P.M.—2500#
200 H.P. Horizontal 4 Pl. Pump—200 G.P.M.—1500#
18"x15' Accumulator 1500#
500 ton down moving ram hydraulic press 42" stroke, 28" between rods.

ACCUMULATORS, PRESSES, VALVES, ETC.

Specialists in Hydraulic Equipment

MONA

AARON MACHINERY CO., 45 Crosby St., New York, N. Y.

Just Purchased!

2—300 K.W. BURKE 3 WIRE, 250/125 VOLT DIRECT CURRENT SYNCHRONOUS MOTOR GENERATOR SETS

SPECIFICATIONS:

Generator: 300 KW—Type CB67, 900 RPM 1200 amperes, compound interpole, serial Nos. 136014 and 136129.

Motor: Synchronous 450 H.P.—Type AC88, 3 phase, 60 cycle, 4150 volts, .85 P.F., serial Nos. 136010 and 136011

Equipment: D.C. Panel Board and Reduced Voltage A.C. Starting Panel

Late Modern Equipment—Like New—Could be inspected while in operation. Location: Cleveland, Ohio

L. J. LAND AND COMPANY
Established 1910
146 Grand St. New York 13, N. Y.
Phone: CAnal 6-6976

Boring Mills, 36"-42"-52"-72"-96".
Bolt Cutters 1"-1¼"-2"-2½" Acme-Landis.
Lathes, 20" to 30" Geared Head, M.D.
Press, Forging 1000 Ton United, St.-Hyd.
Planer, 36"x36"x13' Powell 4 Hds.
Profiler, #13 P. & W., B.D.
Shapers, 10"-20"-24"-36".
Shaper, 36" Morton, Draw Cut
Straightener, Sheet 42" W-F M.D.

West Penn Machinery Company
1210 House Bldg. Pittsburgh, Pa.

DRILL—RADIAL—FOSDICK 3½', G.B., M.D.
KEYSEATER—MITTS & MERRILL No. 6, M.D.
MILLER, PLAIN—MILWAUKEE No. 2-B, Double Over-Arm, M.D.
PLANER, METAL—WOODWARD & POWELL 30"x30"x8', 1 rail head, 1 side head.
SAW, METAL CUTTING BAND—Marvel No. 8, cap. 18"x18"

Available Immediately—Also Many Other Tools

ALEX ZEEVE & COMPANY
2269 Woolworth Bldg. New York 7, N. Y.

FOR SALE
REBUILT AND GUARANTEED

1—Niles Center Drive Axle Lathe, M.D.
1—Niles 48" Car Wheel Borer, M.D.
1—#33 Abrasive Surface Grinder—Motor in Base
1—12" x 6' Lodge and Shipley Selective Head, M.D. Lathe Taper Attch.
1—14" x 6' Fay & Scott Lathe, M.D.—L. Ch.
1—25" x 10' Heavy Duty LeBlond Lathe Q. Ch. —M.D.
1—12" x 4' American Bench Lathe, M.D.
6", 8", 10" Combination Steel Lathe Chucks
Various sizes of Steady Rests and Face Plates for Lathes.

VOLYN MACHINE TOOL WORKS, INC.
149 Broadway, New York 6, N. Y.
340 Tiffany St., New York 59, N. Y.
Tel: DA 9-8779

EVERY ITEM GUARANTEED AS REPRESENTED

FALK FOR DEPENDABILITY IN REBUILT MACHINERY

AUTOMATICS

6—#61 New Britain-Gridley 6 Spindle 1⅝" cap. Automatic Screw Machines. A.C. Motor Drive, Threading Spindle.
1—1¼" Cone 4-spindle Automatic, Motor Driven, Threading Spindle.
1—#515 National Acme 4-Spindle Automatic.
2—#55 National Acme 1⅝" 4-spindle Automatics, complete.
1—#2G Brown & Sharpe Automatic.
1—#1 Brown & Sharpe Automatic, old style.

BORING MILLS

100" Niles-Bement-Pond Bor. & Turn. Mill.
Horiz. #36 Landis-Rochester, 3½ Bar Floor Type—Floor Plate 72" x 120".
42" Bullard Vertical Boring Mill with side head; New Era Type.
#31 Lucas Horizontal Boring Mill, 3" bar.

DRILLING MACHINES

Bickford 4-spindle Rail Drill, #4 Morse Taper. Table 20" x 67".
Avey, 2 & 3 spindle Prentice, 4 spindle.
Henry & Wright, 6 spindle.
Woodward & Rogers, 6 spindle.
Fosdick 13", 4 spindle (2). 2 spindle (1).

RADIAL DRILLS

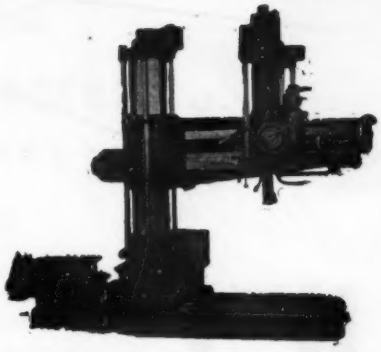
3' 9" col. American, S.P.D.
3' Dreses, 10" rd. col. QCG., M.D.
5' Arm 13" Rd. Col. Cinn. Bick. air clamp.
6' Arm 14" Col. Cincinnati Bickford.

GRINDERS

12" No. 22 Heald Rotary Surface Grinder.
16" Persons-Arter Rotary Surface Grinder.
#4 Brown & Sharpe Universal Grinder.
#12 Greenfield Internal Hydromatic Grinder, sizematic type, complete with Tank and Pump. 15" swing, 5" hole, 4" dee.
Oliver Model 51 Drill Grinder; 1½" cap.
14"x36' Cincinnati, Plain, motor in base.
6"x32" Norton Cyl., overhead c/s drive.
#2 Brown & Sharpe Surface Grinder.
#70 Heald Internal Grinder.
#60 Heald Cylinder Grinder.

Blanchard Grinder #16, 30" dia. Magnetic Chuck, 25 HP 3-60-440 V. Motor.

Pratt & Whitney Vertical Surface Grinder, 14"x36" with 10"x36" Magnetic Chuck. Ball Bearing Spindle. Perfect Condition.



Cincinnati-Bickford 5' Arm, 13" round column with air clamp. Oil grooved, tee slotted base, side base, with plain box table with #5 Morse Taper spindle. Motor drive.

LATHES

14 x 6 Pratt & Whitney semi—Q.C.G.
16 x 8 Hendey Arranged M.D., Taper
16" Warner & Swasey Fox Brass (2).
16" Dreses Fox Brass.
Putnam, 26 x 12 Heavy Q.C.G., arr. for M.D.
Potter & Johnston #6A Automatic Chuckers; 3½" dia. hole in spindle (2).
14 x 6 Hendey Toolroom Lathe, G.H., M.D.
14x8 LeBlond Toolroom Lathe, cone drive.
14" x 6' Hendey 12-speed geared head, motor in base.

MILLING MACHINES

#3, #4, #5 Cinn., High Power, Plain, S.P.D.
No. 0 Bickett Vertical Bench Miller.
#1-#1½-#2 Brown & Sharpe Plain Millers.
P & W 2½" Duplex Spline Miller.
Hall Planetary Thread Miller 24".
No. 8 Lees Bradner Thread Miller.
#1-#2—Kempsmith Plain Milling Machines

PLANERS

120"x72"x35' Betts, 4 Heads, M.D.
48"x48"x12' Putnam Heavy, 2 Heads, M.D.
30"x30"x12' American M.D., 2 Heads.
30"x30"x10' Cinn. Heavy Pattern, 2 Hds.
20"x20"x24" N.-B.-P., Planer Shaper, M.D.

POWER PRESS HEADQUARTERS

#4½ Bliss D.C. B.G. Forging 3" stroke.
#1, Bliss-"Stiles", Plain flywheel.
#35 Niagara back flywheel, geared.
#22 Wells, back flywheel. Open back.
200 ton A.C.F. Hydraulic Press. Bed 24"x 36", 4-post.
7—25 ton Model SL2 K.R. Wilson hydraulic Presses.
Beck Duplex Embossing Press.
75 ton H.P.M. 2 post, Hydraulic Press.
#1 Bliss Straight Side, double action, Cam Press. Will draw and lift out 2¾".

SHAPERS AND GEAR CUTTERS

15' Potter & Johnston Crank Shaper, universal table.
26" Cincinnati Triple Geared, Belt Dr.
12" Schuchart & Schutte Gear Hobber.
#1 Adams Gear Hobbers, Belt driven (3).
#13 Brown & Sharpe Spur & Bevel Gear Cutter.
24" Potter & Johnston Crank Shaper, universal table, power feed to head.

SHEARS & METAL CUTTING MACHINERY

Lennox Splitting Shear, ¾" cap.; 8' throat.
Lennox Bevel Shear, ¾" cap.
Niagara #98 Production Power Brake & Folder. 72"x14 ga. cap. Equal to new.
Bliss #232 Slitting Shear, 14 ga.
Gould & Eberhardt Slitting Shear, 10 ga.
Niagara 16 ga. x 42" Gap Foot Shear.
Niagara #9S Power Seamer.
Niagara 4"x42" Geared Slip Roll Former.
Niagara 3" x 36" Geared Slip Roll Former.
Niagara 48" Roller Leveller. 6 Roll.
Niagara #30 Beader & Flanger.
Niagara #0 Beader.
Niagara #4-E Squaring Shear, 48" x ¼" capacity, M.D.

MISCELLANEOUS

Waterbury-Farrel Cold Header, double stroke, open die, ½" cap. & 6'.

Manville Cold Header, single stroke, solid die, 3/16" cap.

J. C. Miller Co. Lacq. Heater with acquistat.
Heat Treating Furnaces for the tool room.
Sleeper & Hartley #1 Wire coiling machine for making BX cable.
50 K.W. Moesta Gun Welder Transformer, portable, 25 cy. 440 volts.
Hydraulic Pumps—Hele Shaw, Racine, Oil Gear, Motor Driven.
Blake and Knowles 12x2x12 Simplex Type, Hydraulic Steam Pump, 2000 lbs. pressure with 80 to 125 lbs. steam, delivers 9 gallons per minute.
#228C Greenlee Vertical Hollow Chisel Mortizer, Power feed, M.D.
No. 7B High Speed Riveting Hammer, cap. ¾" to 1½". New this year.
Standard Automatic Drop Hammer, 300#.

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MACHINERY COMPANY
Machinery Merchants

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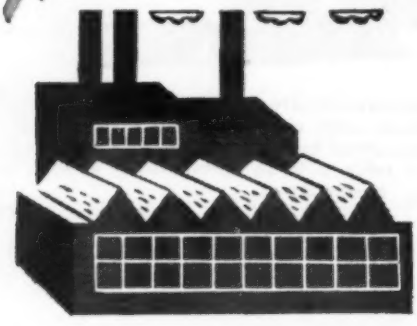
what the PAYROLL SAVINGS PLAN *means*

To you

To your Industry

and your Employees



Facts and figures prove **the Payroll Savings Plan to be a tremendous national asset. Through this plan, no less than 27,000,000 workers have so far saved more than $13½ billions to help speed victory . . . forestall inflation . . . and build peacetime prosperity!**

Did you know that yours is one of 240,000 companies maintaining a Payroll Savings Plan? Not only is this combined effort fostering national security, but also creating a lucrative postwar market for you . . . and all American industry!

Have you realized that 76% of all employed in industry are now enrolled in the Payroll Savings Plan . . . averaging a $25 bond each month per employee? Through this plan, millions are now looking forward to homes, educational opportunities and old age independence!

Surely, so great an asset to your country, your company and your employees is worthy of your continued . . . and increased . . . support! Now is the time to take stock of your Payroll Savings Plan. Use selective resolicitation to keep it at its 7th War Loan high! Keep using selective resolicitation to build it even higher!

The Treasury Department acknowledges with appreciation the publication of this message by

American Machinist

This is an official U.S. Treasury advertisement prepared under the auspices of the Treasury Department and War Advertising Council

HILL-CLARKE
Modernized
CYLINDRICAL GRINDERS *for* SUPER-GRINDING *and* MICRO-FINISH

SIZES AVAILABLE

10x24	14x36	16x50
10x36	14x50	16x72
10x50	14x72	18x96
10x72	14x96	18x120
10x96	16x36	

Hill-Clarke Modernized and Motorized Cylindrical Grinders offer refinements in design which minimize vibration and assure extreme accuracy on all grinding operations. One of these refinements, the Hill-Clarke patented Multiple V-belt Drive to work spindle, contributes to the smoothness in operation which makes possible a finish within a few micro-inches even when using standard grain free-cutting wheels.

Send for a copy of our catalog "Super Grinding."

Have you any NORTON grinders you wish modernized and motorized?

HILL-CLARKE MACHINERY CO.

651 WASHINGTON BOULEVARD **CHICAGO 6, ILL.**

OTT MACHINERY SPECIALS

AUTOMATICS, Acme 9/16" & 1⅝" Model C 5 spdle., M.D.
AUTOMATICS, Acme 2" Model B 4 spdle., M.D.
AUTOMATICS, Gridley, 9/16", ⅞ & 1¼" Mod. G.
AUTOMATICS, Cone, 1¾ & 1½" 4 spindle, M.D.
AUTOMATICS, Gridley, ¾, 1¼, 1⅝, 2¼" & 2⅝" Model F, M.D.
AUTOMATICS, Gridley, 2¼, 3¼, & 5¼" S. S.
AUTOMATICS, Cleveland 1¼, 1½, 2, 2½, 3½ & 4⅝" Model A, M.D.
AUTOMATICS, Cleveland, ⅞, 1¼, & 2" Mod. B
AUTOMATICS, New Britain #22 and 24 Chuckers
AUTOMATICS, New Britain, ⅝x3¾" & 1x5" M.D., Bar Eqpt.
AUTOMATICS, Potter & Johnston #5a & 6a, M.D.
BORING MILLS, 30" Bullard, M.D.
BORING MILLS, Rockford, 3½" bar, Horizontal, 24x72" table, M.D. & 2½" Cleveland
DRILLS, High Speed, B. B. 1 to 6 spindles
GEAR HOBBERS, 12 Barber-Colman, M.D.
GEAR SHAPERS, #7 High Speed, M.D. & #6
GENERATOR, Gleason Spiral Bevel Gear, 10"
GRINDERS, Brown & Sharpe #2 & 3 Universal
GRINDER, Brown & Sharpe #11 Plain, M.D.
GRINDER, Heald #72 Hyd. 2 m.d.
GRINDERS, Bryant #3, 6 & 18 Internal, M.D.
GRINDERS, Diamond Surface #2, M.D.
GRINDERS, Landis Hydraulic, 6x18" M.D.
GRINDERS Pratt & Whitney, 12" Vertical Surface, M.D., 9x31" Magnetic Chuck
LATHES, American 14x6' & 20"x8', M.D.
LATHES, Lodge & S, 20"x10' Geared Head, M.D.
MILLING MACHINES, #2 B Hvy. B&S Plain
MILLING MACHINES, Becker Vertical #5 & 6
MILLING MACHINE, Milwaukee #1B Plain & Universal
MILLING MACHINES, #2 B Rockford Universal
PLANER, Gray 30"x30"x8' 2 Rail Heads
PLANER, Ohio 42"x42"x12' One Head, M.D.
PLANER-SHAPER, 30" Cincinnati, M.D.

OTT MACHINERY SALES, INC.
542 Second Avenue
Detroit 26, Mich.

MONA MEMBER

42" Bullard Spiral Drive NEW ERA Vertical Turret Lathe, 1942

#5 Bardons & Oliver Universal Turret Lathe, complete bar feed, automatic chuck, tooling, 1942

2-L Gisholt Universal Turret Lathe

#2 Cincinnati Centerless Grinder, 1940

8" x 48" Jones & Lamson Automatic Thread Grinder, 1940

#2-S Van Norman Plain Milling Machine, 1942

All latest type machines.
Many more. Send us your inquiries.

HAZARD BROWNELL
Machine Tools
350 Waterman St., Providence 6, R.I.
Dexter 8880

#3F-Fastermatic Turret Lathe, all Hydraulic, 4½" hole, 1 yr. old
#4 Univ. Milling Machine $2,500.00
5" Bar Newark Horizontal Boring Mill, 8' Bed, M.D., $2250.00
16x96 Landis External Grinder, self contained
#17 Barber Colman Heavy Duty Gear Hobber, can take a hob up to 5¾" dia.
16" 8-sp. Bullard Mult-Au-Matics, 2 yrs. old
B & S Surface Grinders 2 yrs. old
#40 Cross Gear Tooth Rounder, M.D.
300 amp. arc welders 1 yr. old
10x36 Norton Hydraulic Grinder, 1 yr. old

PAUL'S MOTOR AND MACHINERY SUPPLY CO.
Detroit 8, Mich.
6111 Vermont Ave.
Tyler 76300

MONA MEMBER

Boring Mill, 24" Bullard, "New Era," M.D.
Boring Mill, 60" Niles, 2-Hds., M.D.
Grinder, Univ. #3 B&S., Int. Att., C/S.
Grinder, Rotary, 10' Walker; 16" Heald.
Lathe, 14"x6' Rockford, QCG; Dr-In Att., Cks.
Lathe, 28"x14' Boye & Emmes, QCG; 2⅛" HS.
Miller, Univ. #3B. Milw. Vert. Att., SPD.
Miller Production, #33 Kempsmith, SPD.
Miller, Vert., #3-H. Becker, hand feed.
Nibbler, 3-B. Campbell, 34"x⅜", SPD.
Sprue Cutter, Tessmer, 1½" Cutter, MD.
Turret Lathe, 26"x7½" Libby-Int., MD.
Welder, Spot, 10 KW. 60 cy. 220 V., 18" tht.

Partial List.

GALBREATH MACHINERY CO.
Empire Building **Pittsburgh, Pa.**

UNUSUAL VALUES

Blueprint machine—3 pieces
Brake, Robinson 5' toggle
Drill, high speed 7' over hang single spindle
Drill, two-spindle sensitive, #1 Morse taper
Drill, 4-spindle sensitive
Gear cutter, Brown & Sharpe #3—26
Gear cutter, Gould & Eberhardt 42"
Grinder, Webster and Perks #1-¾ motor drive.
Hammer, 50# Bradley upright helve.
Two 18"x8' Mueller lathes, H.S. quick change gear
One 16"x6' Hendey Lathe.
Pipe Machine, 8" Oster motor drive
Planer 24"x24"x8' Pease, motor drive
Punch & Shear two ⅞" & ⅝" capacity
Shaper 24" Gould & Eberhardt
Shaper, 18" Barker
Threading Machine #0 Webster & Perks
Tool Grinder Sellers new #0, #1 and #2 magic chuck and collets

THE OSBORNE & SEXTON MACHINERY CO.
COLUMBUS, OHIO

No. 2B Brown & Sharpe Mill, M. D.
Mattison 12" x 16" x 48" Hydraulic Surface Grinder.

MONA MEMBER

D. E. DONY MACHINERY CO.
47 Laurelton Road, Rochester 9, N.Y.

CLOSEOUTS

BORING MILLS
HORIZONTAL
2½", 4" Binsee
4" Landis Horiz., Floor Type, M.D.

VERTICAL
66", 120" Niles
54" Colburn, M.D., 2 hds.

TURRET LATHES
Foster Nos. 4, 5, 6, 1B, M.D. Univ.
J. & L. 2¼x24", 3¼x36"
Acme 3¼" M.D.

GRINDERS
P. & W. 14", 18", B.B., Vert., M.D.
Blanchard 30", M.D.; Modern 12x48", M.D.
Norton Hydraulic 12x18", M.D.
Heald Nos. 55, 70, 72A3 Gagematic, M.D.
Norton 50"x28', M.D.
Gardner 72' disc, M.D.
Landis Type A 6x20" Hydraulic, M.D.
Bryant No. 12, M.D.
Nos. 50, 55, 60 Heald Int. Hydraulic, M.D.
12" Heald Rotary, Arter 15" M.D.
B. & S. No. 2 Surface, M.D.
Norton 10x36" Hydraulic, M.D.
Badger 24" Dble Opposed, M.D.
B. & S. No. 10, 11 Cyl.
No. 2 Cincinnati, Centerless, M. D.
B. & S. No. 1, 3 Universal

LATHES
McCabe 26-42"x14'
24x12' Boye & Emmes 3 step cone, B.D.G.
20"x14' Rahn-Larmon, raised to 24"
14x6' Hendey
9" LeBlond Automatic
36x30' Putnam, M.D.
36x22' Putnam S.C.G., D.C.M.D.
32"x35' Wickes
Putnam 42x16', M.D.
30x26' L. & S. 12 speed M.D.
P. & W. 1x18, 1¼x18 Automatic Lathes

AUTOMATICS
B. & S. No. 2, 6, 6F Hand Screw
B. & S. No. 00, 0
5 Spdle. Davenport 9/16" cap.
Cleveland Model A ⅛", ¼", 1¼", 2"
Cleveland Model B 1", 2"
P & J. 6A, M.D.
⅞" Cone 4 spindle

GEAR CUTTERS
No. 2, 12 Barber-Colman Gear Hobber
B. & S. No. 3-26", 4-36"
Gleason 11" Bevel
G. & E. 60" gear cutter

SHAPERS
24" P. & J.
16", 20", 26", Stockbridge
20", 24" G. & E., M.D.

RADIALS
3', 4', 5', 6', 8' American Triple Purpose
3', 3½', 4', 5' Cincinnati-Bickford
4' Mueller, M.D.; 4', 5' Western, S.P.D.

MILLING MACHINES
10" P. & W. Auto.
No. 3S Cincinnati, S.P.D. rapid trav., M.D.
Nos. 1Y, 0Y, 3, 4, 5 B & S Plain & Univ.
B. & S. Nos. 12, 13, 13B
Hall Planetary Model D Thread Miller
Providence Planer Type 32"x8'
Becker Nos. 3, AB, 5, 6 Vert.
Nos. 3, 4, Cincinnati Vert.
P. & W. No. 12, 30 Profiler, M.D.
No. 4 B. & S. Universal
K. & T., B. & S. No. 2, 3 Dbl. overarm
B. & S. No. 2, 3, Vert.
Milwaukee No. 2½ B Vert.
Kempsmith No. 1 Univ.

MISCELLANEOUS
Gorton No. 1S Engraving Machine
6 spindle Avey Drill, 15" overhang
McCabe ½" Flanger
Rochester No. 5½ B Hammer
Baker #2 Keyseater 5 P.D.
Pels 6" Vert. Shaper
Pipe Machines, 4", 6", 8", M.D.
N.B.P. 15" Slotter, M.D.
#7 Burr Keyseater
Natco No. 13 Multiple Spindle Drill
48" Southwork gate shear ½" 24" gap.
8'x½" cap. Kling Bending Rolls
6' Hilles & Jones Roll

AARON MACHINERY CO.

MONA MEMBER

45 Crosby St.
New York 12, N. Y.

GOOD MACHINE TOOLS

AUTOMATICS
⅞" and 2" Cleveland Model B
1⅝" New Britain 6 spindle
4½" Gridley 4-spindle Model H
No. 454 New Britain, 4-spindle chucking
6"x8¾" Gass & DeLeeuw 4 spdl. chucking
14"x19" Fay automatic lathe
15" Sundstrand Automatic lathe
Gisholt Simplimatic

BROACHES
No. 1 Foote Burt hydraulic surface
Twin 10 Oilgear hydraulic
No. 2S Lapointe hydraulic
No. 3 Lapointe double screw
No. 2 Standard screw press

GEAR CUTTERS
No. 12 Barber-Colman hobbers
No. 12 Bar. Col. long bed spinning
Nos. 7 and 2I Fellows shapers
Nos. 18H & 16HS Gould & Eberhardt hobbers
No. 1 Lees Bradner hobbers
64"x30" G & E spur gear cutter
36"x6" G & E spur gear cutter
No. 36 BM Gould Eber. 3 spdl. bevel
11" Gleason straight bevel, segments & Gears
15" Gleason spiral bevel pinion and gear roughers
18" Gleason bevelteeters and lappers
8" Red Ring spur gear lapper
Cimatool "Peerless" gear chamferers
Lipe 2-spindle gear chamferer
14" No. 5A Lees Bradner gear generator

GRINDERS
No. 2 Cincinnati centerless
No. 72A3 Heald Sizematic
No. 1 G Gronby internal
No. 75 Heald internal
Heald No. 72 automatic electric sizing internal
12"x36", 16"x36" & 16"x72" Landis
6"x20", No. 10 & 6"x32" No. 11 B.&S.
Nos. 1 & 2 Brown & Sharpe Universal
10"x18", 18"x36" & 10"x30" Norton
16"x36" Bath No. 2½ Universal
18", No. 6 Besly opposed disc
20" Gardner semi-automatic disc grinder
Ingersoll face milling cutter grinder, type EN85
Cincinnati face milling cutter grinder
Sellers and Gisholt tool grinders
16"x32" & 16"x72" Landis crankpin
No. 10 Blanchard surface
No. 1½ Cincinnati tool & cutter

LATHES
12"x6' Sebastian
14"x6' Mulliner
18"x8' Boye & Emmes
28", No. 3B Foster turret
28" Gisholt turret
8" and 12" Sundstrand Stub
15" Sundstrand automatic stub
14"x18" Monarch Mannamatic
9"x12" Sundstrand grd. hd. Mfg.
42" Bullard New Era U.T.L.

MILLS MISCELLANEOUS
2½" & 3½" bar Universal horizontal mills
5" Barret cylinder borer
No. 3-B Milwaukee vertical miller
No. 3 Reed Prentice vert. miller & die sinker
No. 2 Cincinnati plain
No. 4—36 Cincinnati Hydromatic
No. 3 Sundstrand bed type mfg. miller
48" Oesterlein tilted offset miller
30" & 42" Ingersoll continuous rotary
Type C Hall planetary thread miller
30" and 48" Newton cont. rotary
No. 4 Lees Bradner univ. thread
4" Rice Barton double spline
No. 6 Whitney hand mill
No. 2 Kent Owens hand
90" Ingersoll Rotary type
48"x21"x22' Ingersoll double column slab mill, spindles front & rear
22"x22"x28' Ingersoll as above.
26"x21"x22' Ingersoll as above

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SAGINAW, MICHIGAN

NO RED TAPE Ready-To-Go!

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#3A WARNER SWASEY, 4½" bar, M.D.
#2 SIMMONS, M.D. (1941)

LATHES
36"x20' N-B-P geared head M.D.
20"x6' AMERICAN, D.B.G. motorized
16"x8' AMERICAN geared head, taper att.
16"x6' MONARCH geared head M.D.

BORING MILLS
3" Universal, horizontal, modern, M.D.
2¾" Lucas, Horizontal, PRT, M.D.
42" BULLARD, vertical turret, M.D.
36" BAUSCH, vertical, Q.C., M.D.

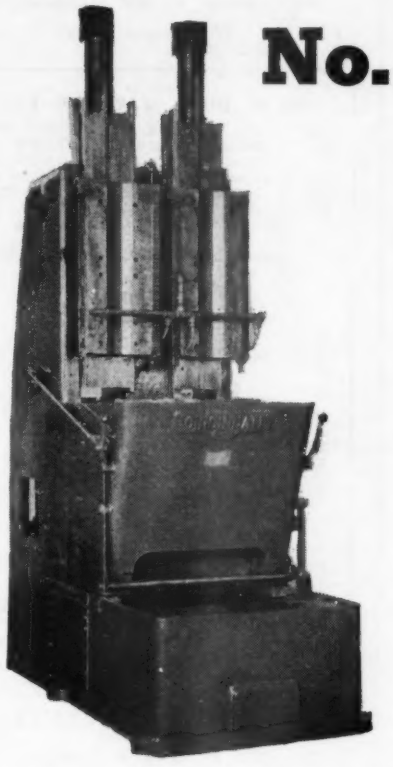
MILLING MACHINES
#4 G HENDEY, Universal, geared head, 10 H.P.

PLANERS
48"x48"x19' D & H, openside, 3 hds.
36"x36"x12' CINCINNATI, 3 heads

GRINDERS
14" PRATT & WHITNEY, vertical surface, B.B., M.D.
#2 DIAMOND, 12"x36", surface
30" BESLY disc, 15 H.P.
#5 GRAND RAPIDS tool & cutter, M. in base

PIPE MACHINES
2", 4", 6" OSTER, M.D.

THE O'BRIEN MACHINERY CO.
113 N. 3RD STREET
PHILADELPHIA 6, PA.
MARKET 4180



No. 5-54 CINCINNATI

Vertical Hydraulic Duplex Surface

HYDRO-BROACH

Maximum stroke in inches 54"

Hydraulic ram movement

Maximum broach length 50"

Broaching force for which tools should be designed 10,000 lbs.

Ram speed, 31' per minute

Equipped with horizontal work table of indexing type

Equipped with coolant pump, ½ H.P., 3 phase, 60 cycle, 220/440 Volt Master Electric motor

Hydraulic pump driven by 20 H.P. U.S. Motor, 3 phase, 60 cycle, 220/440 Volt, 1000 R.P.M. and starter

EMERMAN MACHINERY CORP. 875 West 120th Street, Chicago 43, Ill.

LATEST TYPE MACHINE TOOLS

BUILT IN 1941-1942-1943

TIMKEN BEARING—MOTOR DRIVEN

With 3 phase, 60 cycle, 220-440 volt AC Motors

Available for IMMEDIATE delivery

BORING MILLS—Horizontal

LUCAS No. 41, 3" bar
LUCAS No. 42, 4" bar
UNIVERSAL 3" bar

BORING MILLS—Vertical

BULLARD 36" spiral drive Vertical Turret Lathe with side heads

LATHES

MONARCH 14" x 30" between centers, 16-speed head
MONARCH 14" x 54" between centers, 16-speed head
MONARCH 16" x 54" between centers, 16-speed head
MONARCH 18" x 72" between centers, 16-speed head
LODGE & SHIPLEY 16" x 72" between centers, 12-speed head
LeBLOND 18" x 72" between centers, 16-speed head

TURRET LATHES

WARNER & SWASEY No. 5 Universal; 2½" capacity
WARNER & SWASEY No. 2A Universal; 3½" capacity, with bar and chucking equipment
MOREY No. 3 Universal; 1½" capacity
MOREY No. 4 Universal; 2" capacity

RADIAL DRILLS

AMERICAN Hole-Wizard 4' Plain; 9" column
AMERICAN Hole-Wizard 4' Plain; 11" column
AMERICAN Hole-Wizard 5' Plain; 11" column

GRINDERS

THOMPSON 24" wide, 96" table; surface
THOMPSON 12" wide, 60" table; surface
BROWN & SHARPE No. 3 Universal

MILLING MACHINES

MOREY-SHIELDS 12" x 60" Thread
MILWAUKEE No. 2H Plain
MILWAUKEE No. 3H Plain
MILWAUKEE No. 2H Universal
VAN NORMAN No. 12 Universal
VAN NORMAN No. 26 Universal
VAN NORMAN No. 36 Universal

GEAR CUTTING MACHINES

GLEASON 12" Bevel
BARBER COLMAN Type A with differential

SHAPERS

MOREY 12" Vertical—MOREY 8" Vertical

PARTIAL LIST—*Send us your specific inquiries!*

MOREY MACHINERY CO., Inc.

410 BROOME STREET NEW YORK, N. Y.

AIR HYDRAULIC PRESSES: (New) 5000 lbs. 2"-5" Stroke
AUTOMATICS: (2) Gridley Single Sp. 3¼", 4¼" Cap.
Br. & Sh. #4 (1½") Hi Speed
(2) Davenports 5 Sp. 9/16" Cap. Mod. #24
BORING MILL: Horizontal, Gisholt 4" Bullard V.T.L. 36" (1941) Vertical
CENTERLESS GRINDER: Cinc. No. 2 Filmatic (1941)
GEAR SHAPER: Fellows H.S. No. 712 (1941)
GEAR GENERATOR: 18" Gleason, Str. & bevel gears, segments
GRINDER: Thread, Excello No. 31 (1941)
Thread, J & L 8" x 48" (1941)
Internal-Sav-Way 9" x 18" (1944)
Thread-Excello No. 31 (1943)
Double End, Norton, Model D
Covel Model #91A Un. Tool & Cutter (1944)
Rotary Surface Blanchard #18 Chuck 30" (1941)
B.&S. #2 Univ. Cylindrical 14"x30" (1941)
Int. Heald 72A3 Sizematic (1941)
Landis Crankshaft 16"x 48"
Chucking, Bryant #16 like new (1943)
HOIST: Budget, 1 ton 3 phase AC
LATHE: Adams Short Cut Geared Head 14" x 4' Speed, Sloan & Chase, Collets, Bench type Engine, Lodge & Shipley Selective geared head, 30" x 12' met.
Stub, Sunstrand, Automatic 18" x 15", Type D (1941)
Lodge & Shipley 16" x 6', Q.C., Taper (1941)
MILLER: Milwaukee #2 Universal Q.C.
Plain Horiz. No. 3 LeBlond, Vert. Att.
Plain, Garvin #14 (like #2)
PIPE: Cut-off-3" Hurlbert Rogers
Portable Threader & Cut-off 2" cap.
POWER PRESS: All sizes.
Ferracute—60 ton Coining & Embossing
Perkins Jr. Special Hopper feed
Air Hyd. (New) 2½ Ton 2"-5" stroke
PROFILER: Morey 2 Spindles (1943)
RIVETER: Counter Sinker Farnham, hyd. (1944) 36" Readh
RADIAL DRILL: Cinc. Bickford 2½' x 7½" Rd. Col. (1941)
SAWS: Band, Kalamazoo, Metal (NEW) 8" x 16"
SLOTTER: Vert. Bement Niles—12"
THREAD MILLER: Plan-O-Mill 8" Int. Ext. x 31" long (1943)
TAPPERS: (10) Horizontal Riehert Shaffer ⅜" met.
TURRETS: Simmons Micro-Speed 1¼" Cap. (1943)
(2) Midlands, No. 5 Universal (1943)
W. & S. No. 2 met. in base (1941)
Gisholt No. 21 met. in base (1941)
J & L #5 (1941)
WELDERS: Spot. Larkin 20 KVA (new) no priority

Phones: TRiangle 5-5212-5237

MDNA MEMBER

KINGS COUNTY MACHINERY EXCHANGE
394 Atlantic Avenue, Brooklyn 2, N. Y.

1—Rockwell Hardness Tester as manufactured by Clark Equipment Co., their Model C-12. This instrument was purchased approximately December 1, 1944, for $385.00 and has been used periodically since.

1—Electric Arc Furnace, Model GMS, Detroit Rocking Electric Furnace purchased new from Kuhlman Electric Co., Bay City, Michigan on Febr., 1945 for $2075.00, 50 KVA at 220V-60 cycles, capacity 75-90# per heat cold, 120# per heat hot. This equipment has been used periodically since March, 1945 but is in new condition.

1—High Frequency Induction Furnace, 16 KVA capacity manufactured by Ecco High Frequency Corp., North Bergen, N. J. Purchased June, 1945 for $2750.00 received but never production operated.

1—Electric Heat Treat Furnace, Lindberg Electric Vertical Cyclone, Model 2530EH, maximum operating temperature, 1450 degree. Work baskets 25" x 30" deep. Complete with Leeds & Northrop potentiometer and controls. This furnace purchased January, 1945 for approximately $2600.00, but was never hooked up.

FS-398, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

REYNOLDS
HAS BETTER USED MACHINERY

2—#6 B&S Hand Screw Machines
#16 Blanchard 30" Rotary Surface Grinder
16"x36" Norton Automatic Surface Grinder
12"x36" Norton Hydraulic Surface Grinder
16"x72" Norton Automatic Surface Grinder
#6 Becker Vertical Miller, Motor Driven, Excellent Condition $750
#10 B&S Automatic Milling Machine
#4 Warner-Swasey 12 speed geared head Turret Lathe for bar and chucking work
#5B Heavy B&S Plain Miller, Cone drive
#21 B&S Plain Automatic Miller

REYNOLDS MACHINERY CO.
210 Eddy St. Providence 3, R. I.

LARGE LATHES

30"x26' Lodge & Shipley 12 speed Geared Head, M.D.
32"x35' Wickes Grd. Hd., M.D.
36"x30' Putnam Grd. Hd., M.D.
42"x16' Putnam, M.D.
36"x22' Putnam Geared D.C. M.D.

AARON MACHINERY CO.
45 CROSBY STREET NEW YORK, N.Y.

TURRET LATHE TOOLS

For IMMEDIATE Delivery

SUITABLE for 1", 1½" and 2" CAPACITY TURRET LATHES

Ask for Catalog 943

MOREY
MACHINERY CO., INC.
410 Broome St., New York 13, N. Y.

6' American Plain Radial Drill, M.D.
#3 Cincinnati Vertical Milling Machine H.P.
38"-44" Niles-Bement-Pond Vertical Boring Mill M.D.

HEAVY DUTY MACHINE TOOLS

52" Bullard Vertical Boring & Turning Mill.
6' Cincinnati Bickford Plain Radial Drill.
7' Cincinnati Bickford Plain Radial Drill.
7' American Triple Purpose, Motor on arm.
27"x16' Lodge & Shipley Grd. Hd. Tapers.
30"x14' Schumacher & Boye Lathe, Q.C.
10' Cincinnati Heavy Duty Boring Mill, M.D.
12' Niles-Bement-Pond Heavy Duty Boring Mill, M.D.

GRINDERS

12"x96" Landis Plain, S.C.
18"x85" Landis Plain Self contained.
#78 Covel Hanchett Surface.

GEAR MACHINERY

18" Gleason Bevel Gear Generators.
6" Bilgram Bevel Gear Generator.
#1 Adams Gear Hobbers.
#1 Schuchart & Schutte Gear Hobber.
#3 Adams Farwell Gear Hobber.
#61 Fellows Gear Shaper, Cone drive.

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96"x96"x36' Cincinnati 4 Hds. M.D.
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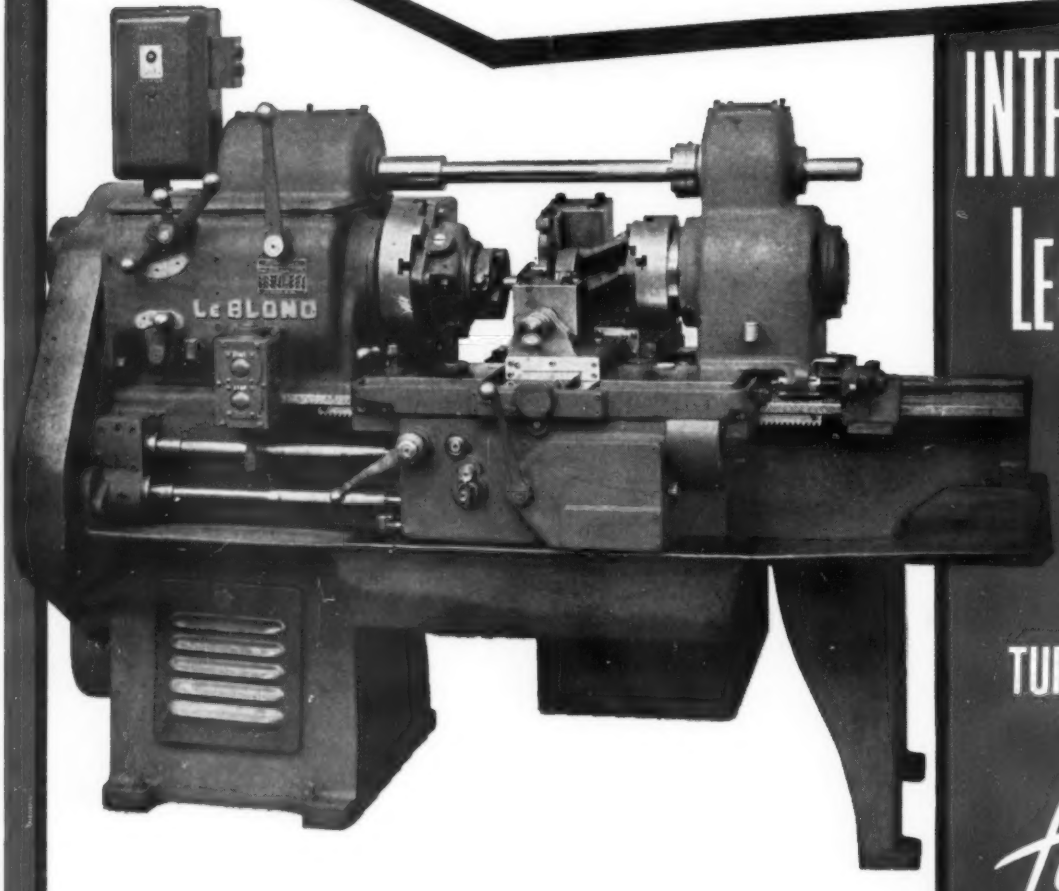

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